JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

VOL. XLIX.

PART II. (NATURAL HISTORY, &c.)

(NOS. I TO IV.—1880.)

EDITED BY

THE NATURAL HISTORY SECRETARY.

> "It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease." SIR WM. JONES.

CALCUTTA:
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ERRATA AND ADDENDA.

p. 14. Bones of fishes from the Trias of Tibet referred to under the head "Cretaceous," should have been mentioned in the preceding paragraph.

p. 24. At the time of writing the notice of Siwalik Carnivoras I had not seen the paper by Mr. Bose on that subject,* and consequently was not aware that *Felis grandicristata* and *Canis cautleyi* are merely provisional species. It should also have been mentioned in treating of the genus *Ursus*, that there is in the collection of the Indian Museum, a canine-tooth from the Irawadi Siwaliks probably belonging to this genus.

p. 31. In treating of the Pleistocene Proboscidia it should have been mentioned that the first described teeth of *Mastodon pandionis* are said to have been obtained in the Deccan by Col. Sykes.

p. 34. Line 5 from top for *duvancellii* read *duvaucellii*.

p. 35. After *Lutra palæindica*, there should be mentioned the probable occurrence of a second Siwalik species.

" The name Clift, in place of Falconer and Cautley, should be appended to *Mastodon latidens*.

" After the name *Chalicothecium sivalense* add (F. and C.)

p. 37. Line 8 from top; after *Megaloscelornis sivalensis* (Lyd.) add S.

" " 21 from top; after *Colossochelys atlas* (F. and C.) add S. I.

p. 49. *For* $EI \equiv O_1 + 0{\cdot}4775\ P_{\cdot 01}$ *read* $EI \equiv O_1 + 0{\cdot}04775\ P_{\cdot 01}$

also " $P_{\cdot 01} \equiv 0{\cdot}009947$ " $P_{\cdot 01} \equiv 009956$.

p. 52. Line 22, *for* "resect" " "result."

" " 23, " $P_{\cdot 1}$ " $P_{\cdot 6}$ in one place.

p. 53. " 23, " W " O

" " 23, " W_1 " O_1

p. 63. " 5, from bottom *for* "," *read* "—"

" Last line *for* "Sq" *read* "SG"

p. 69. Last line " $0{\cdot}64475\ P_{\cdot 03}$ *read* $0\ 60475\ P_{\cdot 03}$.

In the right side of each equation of condition on p. 55, a decimal point has been substituted in each for a space of separation, and the differences have thus been made to appear as decimals forming the right sides to the corresponding equations.

Thus in line 3.

Diff.

$$\ldots\ldots\ldots\ldots + 0{\cdot}020194\ R_1 \equiv 0{\cdot}275\ R_1$$

Should read

Diff.

$$\ldots\ldots\ldots\ldots + 0{\cdot}020194\ R_1 \equiv 0 \qquad 275\ R_1$$

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* Q. J. G. S. Vol. XXXVI, p. 119.

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

VOL. XLIX.

PART I. (HISTORY, ANTIQUITIES, &c.)

(Nos. I TO IV.—1880: with 22 Plates and 2 Maps.)

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THE PHILOLOGICAL SECRETARY.

> "It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease." SIR WM. JONES.

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ERRATA.

Page 207, line 2, *read* (With two Plates).
" 208, " 7, " Plate XVIII.
" 209, " 1, " Plate XVIII, *a*.
" 210, " 11, " Plate XVIII, *a*.

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JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

Part I.—HISTORY, LITERATURE, &c.

No. I.—1880.

Description of the Great Ṣiva Temple of Gangai Kondapuram and of some other places in the Trichinopoli District.—

By LIEUT.-COL. B. R. BRANFILL. (With a Plate.)

During the past season I visited and examined the great Ṣiva temple of Gangaikoṇḍa (-Shola-)puram (Gangacondapuram of A. S. 79), situate in the extreme E. N. E. part of the Trichinopoly District, 20 miles S. W. from Chidambaram.

As this is the largest* and best specimen of a South Indian temple proper I have ever met with, I venture to offer a short description of it. Roughly speaking it is a facsimile of the great Tanjore Temple, possibly its prototype, or perhaps more probably a copy; but never having been "restored," as the Tanjore example has, and being built throughout in a very hard kind of stone, it retains much of its pristine appearance and purity of design, which has been lost there.

I made notes of my observations on the spot and took measurements, sketches and some impressions of the inscriptions with which its base is covered, as specimens of the character, which is mostly old Tamil, very similar to that at Tanjore.

Gangaikoṇḍapuram is the site of a deserted town supposed to have been the city or chief town of Gangaikoṇḍa Chóla.

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* The largest Indian sanctuary towers mentioned by Fergusson (Hist. of Arch. Vol. III.) are those of Jaganáth at Puri and the great Tanjore Pagoda, which are 80 and 82 feet square at base respectively.

Most of the inscriptions appeared to be mere statements of gifts made to the temple by private persons. The western and southern (side) inscriptions appeared to be mostly in the Tamil character and language with occasional Sanskrit formulæ to begin and end with. Those on the northern side were said to be chiefly in Grantha and Telugu or other (than Tamil) characters.

The temple consists of a grand stone "stubi" (as they called it), a sanctuary *steeple* or Vimánam on a raised basement or terrace, decorated by a rail ornament below, having the upright posts engraved with griffins (or *Yáli*), and an elaborate scroll-enveloped animal or figure on every third or fourth post, but no cross-bars or horizontal rails between.

The *Álóḍai* or terrace-path is 3½ feet wide, surrounding the entire temple, including the great Veli-mandapam or Outer court, at a height of about 5 feet above the (original) ground level.

The great pyramidal Vimána is 100 feet square* at base and about 165 feet high. The double story below the pyramid and immediately above the terrace basement is vertical, with five compartments or towers on each face (north, west and south) of the temple, separated by four deep recesses, with a handsome sculptured ornament (*purána kúmbam*) in each recess. Each projecting compartment has a fine sculptured figure, chiefly Ṣaiva but not without important Vaishnava figures, and the plain intervals of flat wall are covered with (?) historical scenes of rishis, kings, worshippers and attendants, celestial as well as terrestrial, in low relief.

Above the double vertical story rises the pyramidal *stubi* in seven stories to the neck which is spacious and supports four bulls (as at Tanjore) below the dome or semi-dome.

The whole temple is of stone throughout, and the domed top is apparently carved to represent a copper tile or leaf-pattern covering, like that of the five halls (*sabha*) at Chidambaram.

The only or chief ornament of the pyramidal portion of the tower is the square and oblong cells of "Rath" (= car) or Gópuram (= spire-roofed) pattern, with their elaborate fan-shaped windows, like spread peacocks' tails.

There is little if any stucco to be seen, the whole being of pure stone.

On the east side and attached to the great *stubi* is the Méle-Mandapam (= a high court or west court), a three-storied portico or transept covering the cross aisle between the north and south entrances to the Temple; this is built to match the Vimána, as at Tanjore.

To its east again and attached to it, is the west wall and end of the great Outer court (Veḷi-mandapam), begun in the same magnificent scale

* See note above.

and style, but never completed: for it is broken down or left off rather abruptly, and finished by a plain large hall, completely enclosed by its four wâlls and flat roof, only half the height originally designed.

It measures 80 feet wide, North and South, and 163 feet long, West to East, with a plain doorway in the middle of the east end, having huge stone warders (*dwárapál*), but otherwise devoid of any fine ornamentation. It is 18 or 20 feet in height, and the roof is supported by four rows of plain stone pillars.

There is a large uncovered and incomplete portico in front (East) of the Veli-mandapam, approached by a double flight of steps from North and South and 10 or 12 feet above ground level, which is the level of the interior of the mandap and temple.

The court-yard of the temple is about 610 feet East and West, by 350 feet North and South, with a fine gópuram or entrance tower built entirely of stone (fast falling down) on the East, of grand but suitable proportions, not half the height of the temple itself. Usually the gópuram is 8 or 10 times as high as the temple sanctuary.

The court-yard or quadrangle was once surrounded by a double-storied open cloister of plain but solid stone work, said to have contained 365 cells (in the two stories), but only a few of these remain in the centre of the north wall there is a small plain doorway.

The surrounding wall was of stone and must have been about 25 feet high.

The sculptures round the base of the temple are very good in design and execution.

The architecture struck me as grand, simple and pure, with many traces of the wooden construction of which it is, in many respects, a copy; especially in the projecting beam-heads at the angles, each of which is surmounted by a rude lump roughly resembling a flattened spiral (conch-) shell, perhaps intended for the sálagrám (black ammonite or serpent-stone); only this is a Ṣaiva temple.

I did not notice the Nága, but saw traces of trees with umbrellas over them.

The (proper) right hand Dwárapál has the right foot raised and resting on a stump (of a tree), encircled by a serpent with a half-swallowed elephant in its mouth, at all three doorways alike.

The projecting stone cornice of single convex flexure is massive, but does not stand out so far as in many more modern cases I have noticed elsewhere, but is, I should say, more free and prominent than some to be seen at Chidambaram.

I did not see the imitation of wooden rafters and laths, with nail heads &c., to be seen at Tinnevelly.

The usual Bull (*Nandi*) in front of the temple is a poor one, compared with that at Tanjore.

The minor temples and shrines in the court-yard are inferior and mostly in ruins.

One of the more conspicuous of the sculptures represents Ṣiva coming out of an opening (*yóni* or split) in a cylindrical stone column (or *lingam*).

This figure is represented at Tanjore and elsewhere, and is to be seen repeated here several times in various parts of the Gangaikoṇḍa Sholapuram temples.

A figure of a rishi (Márkaṇḍa) on his knees, with forehead on the ground, is below.

The pillars and pilasters are very plain, square in the four towers (or *rath*-like portions), forming the four corners of the *stúbi*, ornamented by pointed leaves below the capitals, which are very fine large tabular slabs.

The square pillars or pilasters are not cut away to the octagon form leaving square blocks, as is common. The pillars and pilasters of the next, intermediate, partitions or towers are octagon throughout, with similar lanceolate ornamentation and (octagonal) capitals.

The central partitions or towers have 16-gonal pillars and pilasters with similar ornaments and capitals.

The plinth moulding is very grand, bold and chaste. It re-called to my mind the pattern of the plinth moulding of an unfinished temple at Kuttálam (*Courtallam*) in Tinnevelly.

The flat portions of the walls are covered with (?) historical scenes in which rishis and country folk, herdsmen &c., figure largely.

There are three or four wells in the Temple court, one of which (the Sin(g)ha Tírtham) is connected with the legend of the founding of the temple and possesses a never-failing supply of very good water.

I noticed that the name on the Tamil inscriptions was Gangaikoṇḍa Sholapuram and Gangaikoṇḍapuram. The inhabitants now call it Gangaikaṇḍapuram. They told me that the Stalapuráṇa or local historical record of Gangaikoṇḍapuram had been taken to Tanjore and a copy placed in the Rajah's library there, whilst a copy (or the original) was taken and kept by the copyist who now resides at Nachaiyárkóvil (or at Tirichirai) near Kumbakónam.

Another place of interest I visited may be worth mentioning though quite modern, and that is Rámalinga-pillai-sálai, a remarkable church or college building, called variously *Pardésimaḍam, and Sanmárga-Sabai*, situate on the high road from "Cuddalore" to Vriddháchalam, a mile or so west of the point where the high road from Madras (viâ Panrutti) to Kumbakónam crosses it.

A few years since, one Rámalingapillai collected followers and money and attempted to establish a new religion. He appears to have taught the ethics of Christianity without its theology. But I could not get at any precise particulars. Having collected some hundreds of followers (2000 was stated) and built his college, Rámalingapillai retired with some ceremony into concealment in a house, now styled "*Tirumáligai,*" in the village of Moṭṭukuppam, a few miles distant from the College.

He is said, by his followers who now await his re-appearance at "the last day," to have never come forth from the room in which he disappeared, or to have been seen again.

I think the true facts of the case are worth eliciting and putting on record. The building is a remarkable one of brick and *chunam* in the modern Eurasian composite style, and the domed part of the roof or cupola appears to be covered with sheet metal.

I also visited Chenji or Sanji-Kóṭṭai (Anglice *Gingee*), a remarkable precipitous bluff rock, covered with and surrounded by fortifications of no very ancient date apparently. It is just the kind of stronghold that was likely to be seized on and held as a citadel by the successive conquering armies that have overrun the Carnátik for some centuries past.

The most interesting thing I observed here, beside the natural fastness (a notice of which is to be found in the *South Arcot Gazetteer)*, was a very rudely carved stone lying in front of a small shrine halfway up the rock on the south side, dedicated to a local goddess called Kamala-kanni-y-amman to whom human sacrifices were formerly offered. Plate I shows copy of a rough pencil sketch taken hurriedly on the spot. Four human heads occupy a square raised shield, with two parallel bars in the centre like a pair of dumbells with small knobs, which might stand for footprints. Each pair of heads is separated by a *triṣul*-like mark immediately above and below the pair of bars in the centre. Above these in the centre at top is a pair of ram's (?) horns, surmounted by a short transverse bar and appendage which I could not make out, and in the centre below, a corresponding pair of buffalo (? *kulgá*), horns and head. A bow to the right and five arrows to the left on the lower part of the stone, at each side of the raised part, complete the carving. The arrows are club-headed and feathered, and one of them is furnished with a hole at one end, as if to hold a line. The entire stone is an oblate circle about 3½ feet high and 4½ feet wide, and not very thick, lying flat on the ground. Close to it is an upright figure of "Minudaiyan Virappan," with hands together in the attitude of respect or supplication, and a sacrificial post stood near.

The *grám-munsif* said that this "kóvil" or chapel was held in great respect by the country-folk and was originally there before the present fortifications were built. Sacrifices are still made in times of drought and dearth and are supposed to be very efficacious.

The temples at the base of Chenji and some of the sculptures and remains are very interesting, extensive and well wrought, but apparently modern, though quite deserted and going to ruin. The monkey god Hanumán is to be seen in several places sculptured on the rocks.

Since the road was made which passes through part of the Chenji fortress, it has been frequently visited and despoiled of its sculptured treasures. I was informed that the fine columns which adorn the "*Place*" at Pondicherry were removed hence by stealth, by an enterprizing Frenchman. But we need not grudge them, for they are appreciated highly where they are, instead of being neglected and lost sight of in the spot where they formerly lay.

Some very handsome sculptures have been removed and set up at Chittámúr, a few miles distant to the eastward, near a new temple built by a neighbouring chief.

The traditional founder of the fortress is said to be one Supálaka (or perhaps rather *Tupákala*) Náyak.

I may here mention that the Stalapuráṇa of Senji-Kóṭṭai was stated to have been taken away by the Collector of the District (S. Arcot), a few years ago, and never returned.

At Mailam *(=Mayúrastalam)* near Tindivanam, the Tamburán (or abbot) informed me that his temple was founded by King Jayamba or Jayambaga Mahárája, from the north, who also founded or built Senji-Kóṭṭai. This old fellow is a very fine specimen of a man who never touches flesh or any cooked food, but lives on fruit and milk only. He has repaired and restored his temple and is now building a fine stone gópuram on which I was shown a sculpture of himself in the style of an old bearded Rishi. He reminded me of the Tamburáṉ (or abbot) of Tiru(p)pan-andál near Kumbakónam.

Another very interesting place I visited near Tindivanam is Perumukkal ("*Permacoil*" of Orme and of the Indian Atlas, sheet No. 78). Perumukkal is the common pronunciation in the district. At the place itself it is called, and written also, Perumukkúl.

Like Senji-Kóṭṭai it has been a fortified stronghold for some centuries. It has a fine large stone mandap on the summit and some small temples or shrines, but the ruins of some larger ones strew the summit, sides and base.

The rock is an isolated one of dark granitic boulders, very precipitous in most places. It is the last to the S. S. Eastward of the rocky masses that stud the plain of the Karnatik to the south-west of Madras.

I noticed stone circles at its eastern base, as well as at other stony places to the west and south-west, on both banks of the Ponniyár (S. Pennár or Pinákini.)

Mr. Garstin in the S. Arcot District Manual gives Peru-múkal (=great travail), from a legend of Sítadévi having here given birth to twins. There are two villages near, called Nalmukkúl (or Nanmukkúl) and Palamukkúl, names having reference to the same legend. Mr. Garstin also mentions Jánikipéṭṭai, and I may add Rámanáthapuram, all in the immediate vicinity. But the old Sanniyási or hermit sent for the stalapurána (kept by an artizan in the neighbourhood) and wished to show me from it that the proper name of the hill is Mukkiyáchalam, and that it is therein styled Madhyakási (Middle Kasi) and is the scene of Rishi Válmiki's penance, death and burial. A ruined shrine attached to the mandap is pointed out as the spot where he was interred.

There are the remains of many fine sculptures here, destroyed by the Muslím, and many inscriptions on the base of the temples.

The fort was held and besieged repeatedly in the wars of the Karnátik in which much damage was done by the roundshot.

The following observation may be worthy of record.

At Gangaikoṇḍapuram the wells are said to have a perennial supply of good water near the surface, that fails not in the driest seasons ; and at Chidambaram the same is said of the great tank in the temple enclosure. At Tiruvaḍi (A S. 79), close to Panrutti, I noticed in the bed of the Geḍilam or Garuḍanadi (the "*Cuddalore*" river) a natural spring or fountain of clear water, welling up with some violence in the midst of the muddy river-water. It is said to be perennial and to be as good as Kávéri water, whence it is locally called *Kolladattumólai* = *Kolladam* or "water-spring".

In connection with these I may mention the artesian wells that have recently been opened at Pondicherry and suggest that the perennial supply at Gangaikoṇḍapuram, Chidambaram and Tiruvaḍi may be explained by there being at those places a connection with the water-bearing stratum which is the source of the artesian wells, underlying the extensive laterite beds of the *Cuddalore* or S. Arcot district. I have heard of other places, particularly near Villapuram on the South Indian Railway, where the subjacent springs have been tapped by the natives and the outflowing water long since utilized for irrigating their fields.

Rude Megalithic Monuments in North Arcot.—

By Lieut.-Colonel R. B. Branfill. (With a Plate.)

I have just had an opportunity of visiting the disused *tomb-field* at Iralabanda Bápanattam, in the Palmanér taluk of North Arcot.

The tombs here are of unusual interest from the size, shape and arrangement of the slabs of which they are composed, and the rarity of their chief characteristic.

The usual kistvaen or megalithic sepulchral cell is enclosed by three concentric rings of upright stone slabs, each slab having its top rudely worked (chipped or hammer-dressed) into a semicircular or a rectangular shape, and set closely side by side alternately, the round-heads standing higher than the intermediate flat-heads by the amount of their semi-diameter, *i. e.*, the height of the rounded portion, so as to form a parapeted wall of rounded *merlons* with flat silled *embrasures.*

These walls or parapets rise in three concentric tiers on a slight mound or cairn, a foot or so above the general ground level.

The outer circle or tier consists of some 24 slabs, nearly 3 feet wide, half of them being semicircular at top and standing about 3 feet high, the whole forming a ring fence or enclosing wall about 30 feet in diameter.

The second tier has 16 slabs, 8 of them round-headed, rising to a height of 5 or 6 feet above the cairn or mound; the whole forming an intermediate ring-wall about 22 feet in diameter.

The third or inner wall is composed of four prominent round-topped slabs, 8 to 10 feet wide, and 12 or 15 feet high above the cairn, and 4 or 5 feet higher than the other four flat-headed slabs that stand between them and complete the inner ring, an octagon of some 16 feet in diameter, or rather a square of 12 to 15 feet, with the corners cut off.

The kistvaen or sepulchral chamber nearly fills up the internal space, the capstone or covering slab of which sometimes projects horizontally beyond the chamber below it, so as to fit closely to the four great round-headed slabs that enclose it, the 4 flat-headed corner stones being only about the same height as the capstone, and narrower than the others.

The only entrance to the interior was apparently intended to be solely by small holes broken in the two or three central slabs on the east front, and nearly opposite to the similar hole in the eastern wall-slab of the kist. There is a kind of antechamber or closed portico between the inner chamber and the inner enclosing wall, provided with a moveable shutter stone or slab.

The stone slabs used throughout are comparatively very thin, being usually about 3 inches thick, and even the great capstones seldom exceed 6 inches.

The whole forms an imposing structure, and recalls the idea of a small citadel or fortification.

There are many examples, perhaps a score or more of this pattern, still partly standing, and about as many more of a very similar kind, only without the round-headed projections, all the slabs in each ring or tier being of the same height, about 7 feet above ground level, and completely hiding the enclosed kistvaen.

Dividing the tombs into three classes according to size, and counting the fallen and half buried, as well as those standing, there are 170 of the 1st or biggest, 210 of the 2nd, and 200 of the 3rd or smallest sort, a simple kist composed of slabs from 2 feet square and upwards, more or less buried in the earth, and without any enclosing walls or circle of stones remaining.

Most of the tombs in this *nekropolis* are much ruined and overgrown by jungle so that I suppose there may well have been many more than 600 tombs here, within a space 500 yards long and 300 wide. The interments have but a shallow covering of soil, sometimes less than one foot.

On excavating they were found to yield the usual sepulchral relics, except that iron weapons were very scarce or entirely absent, whilst the terra-cotta coffers were more abundant than in the similar tombs of Mysore. In one, a few ornamental beads, similar to some taken out of the Coorg tombs, were found lying near the remains of a human skull.

Some of the coffers, sepulchral troughs or trays, were ornamented with a chain ornament in festoons and furnished with projecting rings or loops and prominent hooks, as if to hang garlands on. Some were mere small flat oval troughs, whilst others ranged up to 4 feet long, 2 feet wide and high, and were furnished with four or five pairs of legs.

Perhaps however I need only further mention the chief novelty that struck me, and this may be no novelty to others.

Two or three Tamil letters were found scratched on a fragment of a little bowl. They seem to spell the words *saduma* or *chathum* or *chadud ;* the final letter (? *m)* is very doubtful and may be intended for a terminal *d* or *t*, if that were admissible.

I have some rough notes and sketches of a few of the monuments, but had no leisure to explore further. A careful collection and close scrutiny of every fragment of the pottery (which is abundant and of the rude but antique and polished kind) would probably yield some valuable and curious information as to the habits, &c. of the tomb builders.

The locality has a bad character for being feverish and is in a very retired part of the country just above the Eastern Ghats.

The way to it lies through Chittúr and Palmanéri whence there is a good road for 15 miles to the S. W. to Baireddipalle, and thence a bridle path for 6 miles *viâ* Neilipatla to Bápanattam. The nearest name marked on the old Indian Atlas, Sheet No. 78, is "Yerlabundah" (? Irala-rock). The Irala are the wild folk who roam the jungle in search of forest products and a free silvan life. During the rainy season some of them are said to dwell in these tombs, many of which would afford them perfect dwelling-houses, and the marks and relics of their recent occupation are to be seen frequently and unmistakeably.

I know of but three or four other places where these peculiar rounded slabs are to be seen, but they will probably be found to be more common when looked for.

The Coins of the Mahárájahs of Kángra.—*By* C. J. Rodgers.

(With a plate.)

Káng**ṛ**a is the name of a fort and town situated at the junction of two mountain streams which form a tributary of the Biás on its right bank ere it leaves the hills. The coins in the accompanying Plate II go by the name of Kángṛa coins now-a-days. But the rájahs whose coins they are were known in history by the name of the Rájahs of Trigartta, the country of the three rivers, the Rávi, Biás and Sutlej. The family of these Rájahs claims its descent from Susarma Chandra, governor of Multán at the time of the Mahábhárata. After the war was over they went to the hills for refuge and erected the fort of Kángṛa for their protection. The district under the Rájahs of Kángṛa seems to have been like all districts governed by such Rájahs in old unsettled times. Kángṛa was their mountain stronghold. The neighbouring district of Jalandhar was subject to them, and must have furnished a considerable portion of their revenue. So the Rájahs of Kángṛa would be known at that time as Rájahs of Jalandhar. Being of the lunar race they kept the title *Chandra* after their names.

The Indo-Scythians conquered the fort of Kángṛa. When Mahmúd conquered it "the genealogical roll of the Indo-Scythian princes of Kabul for sixty generations was found in the fortress of Nagarkoṭ by Mahmúd's soldiers"[*] (Kángṛa is known in the history of India by the name of *Nagarkoṭ*). From this fact, and from the immense amount of wealth taken from Kángṛa by Mahmúd, General Cunningham infers that "Kángṛa must have belonged to the Rájahs of Kabul for several generations, and that it was their chief stronghold in which they deposited their treasures."* Not only this, but General Cunningham thinks that the wealth accumulated in Kángṛa at that time consisted of the silver pieces of the Hindu Rájahs of Kabul which are even now found so plentifully throughout the Panjáb—the coins of Samanta Deva, Syalapati Deva, Bhím Deva and Khadavaya Deva.†

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[*] General Cunningham's Archæological Report, Vol. V, for 1872-3, p. 155. The General quotes Abu Rihán's statement as contained in Al Biruni. I may here state that I am indebted to this report for nearly all my facts concerning the Mahárájahs of Kángṛa and to General Cunningham for much valuable aid generously given when I began to collect the coins drawn in the plate.

One fact bearing strongly on this view the General seems to have overlooked. All the coins of the Kángṛa Rájahs with some few rare exceptions are of the horseman type. Some are of the bull and horseman type with the names of the Rájahs over the bulls. Nay more than this, the earliest Kángṛa coins bear the name of Samanta Deva over the bull. That they were coined in Kángṛa no one will doubt who will cast his eye over the coins of the Rájahs in the plate. I once attributed the first two coins to Susarma Chandra. But a careful examination of the letters together with the results of a comparison of the letters of other coins with these, has convinced me that they are the coins of Samanta Deva.

The list of names of the Rájahs of Kángṛa from Susarma Chandra down to the last Rájahs is of course obtainable. There is no reason for doubting its correctness. But as yet no coins have been found going further back than Prithví or Píthama to whom General Cunningham assigns the year 1330 A. D. This is an approximation only, but based on fair reasoning. Judging by the number of coins obtainable of any prince we may I think fairly infer the length of his reign. The fewness of the coins argues that the reign was short. Before Píthama I believe the coins of Samanta Deva were coined and used at Kángṛa. There are immense numbers of these coins found yearly in the Panjáb. Some of them have the horseman after the usual type, horse well shown and the whole body of the rider with letters on either side his head. The bull is well developed too and the name above it is generally legible. But the Kángṛa type of Samanta Deva, which the die-cutters of the mints of the Rájahs of Kángṛa seem to have slavishly adhered to, is unmistakeable, after it is once studied and known. The other well drawn coins are probably those of the Kabul or some other mint.

We must not be surprised if the coins of all the Rájahs are not obtainable. The coins of Kashmír, though very abundant, have many kings unrepresented. The coins of Chumba a neighbouring state to Kángṛa bear only the names of a few Rájahs, although the list of kings numbers no less than 170 sovereigns. Coining seems to have always been considered the peculiar privilege of paramount sovereigns or of independent rulers. Bearing this in mind, we need not wonder if any hiatus occurs in the lists of coins as compared with that of the Rájahs. Nor must we wonder if a small number of coins turns up bearing names of rulers to whom we cannot attribute any country. Jalandhar and Kángṛa must have been subject at different periods to Kashmír as well as Kabul and perhaps to Kanauj. General Cunningham gives the following list :—*

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* Ibid, p. 156.

† I have seen several hundreds of these coins this year.—C. J. R.

Accessions.	Name in list.	Name on Coins.	REMARKS.
1330.	Prithvi.	Pithama.	
1345.	Purva.	Apurvva.	
1360.	Rupa.	Rúpa.	Contemporary of Firoz.
1375.	Sringara.	Singára.	
1390.	Megha.	Megha.	
1405.	Hari.	Hari.	Brothers.
1420.	Karmma.	Karmma.	
1435.	Sansára.	Sansára.	Contemporary of Muhammad Sayid of Delhi, A. D. 1433—1446.
1450.	Devanga.	Avatára.	There is *one* coin known of Devanga.
1465.	Narendra.	Narendra.	
1480.	Suvira.	......	
1495.	Prayaga.	......	
1510.	Ráma.	Ráma.	Died 1528, A. D.
1528.	Dharmma.	Dharmma.	
1563.	Manikya.	......	
1570.	Jaya.	......	
1585.	Vriddhi.	......	
1610.	Triloka.	Triloka.	Rebelled against Jahángir, 1619 A. D. Triloka was the last king who coined. There are 12 more names given in the list.

A little study of Plate II will show that the coins are of several kinds. The commonest is that which has a bull on the obverse, with the name of Rájah above the bull. The reverse in every case except one has on it what is intended for an image of the horseman and horse. But as a rule there are only the legless hind-quarters together with the thigh and boot of the rider visible. The one mark on nearly all of them is the *spear* the horseman carries. First of all fixing this and remembering that the spear is carried close behind the man's thigh, to the right should come the horse's head and to the left the hind-quarters. But in reality only portions come on the coin. The die must have been as large as the silver coins of Samanta Deva which are a little broader than a four-anna piece. The boot is in some cases fully visible. But the head of the horseman is nowhere to be found. The spear has a notch on it near the bottom and a flag at the top. So it was a regular lance. Whether the man wore armour or not we can't say.

These coins are found in considerable numbers not in Kángṛa itself, but in Ludiána, Jalandhar and Umritsur. Vast quantities of them are however annually melted down and very soon there will be no more obtainable. Some of them may contain a very small amount of silver. It is very seldom I now meet with any in Umritsur. It is so with everything. I do not know what provision Government may be making to secure a cabinet of coins for the museums of the country. I believe no provision whatever is being made. A few private collectors are at work for their own cabinets which in the course of a few years will find their way to Europe. The coming generation will have to receive history on mere hearsay. The numismatic monuments are fast disappearing. The old Rájahs in many cases are known already only by name. No records are obtainable of them. One would think that before it is too late Government should interest itself in the matter. The British Museum is far richer in the coins of India than any Museum in India. This is a mistake. If India is to be for the Indians, it is a pity to export from the country all those mementoes of former things and dynasties. Patriotism and loyalty go hand in hand with us. It would surely be wise in our Government to create a love of country in the hearts of the people of India. We want something to displace the grasping and selfishness which everywhere show themselves. The historic remains which lie round about us are not understood, or are rather misunderstood and not valued. History is taught as a matter of dates and names and is useless. Museums are collections of odd things which are to the educated and uneducated alike voiceless. The teachers of history cannot read the coins which would add interest to their lessons.

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* Vol. V, Archæological Report, p. 152.

Of all the provinces of India, the Panjáb has more historic associations than any other. From the time of Darius to that of the Empress of India, the Panjáb has been an arena on which great struggles have taken place. Yet the coin cabinet of the Lahore Museum is wretchedly poor. A few Græco-Bactrian coins, a few Indo-Scythian coins and a few odds and ends with the names attached to them of the persons who presented them (!) are all that are visible to the ordinary visitor. The curator, in whose charge are the valuable coins which are always kept under lock and key, is generally engaged during the day. So visitors passing through Lahore see next to nothing of what ought to be visible at all times. There is no catalogue of the coins, and many valuable ones have been already lost. This is again a mistake. It is exactly the same at Delhi, where the coins are all in a box !!

These remarks are made not in a captious spirit, but with a real desire to direct attention to the proper use of museums and provincial coin cabinets, and also with the hope that both be made more use of in the education of the people for whom the museums were built and with whose money they are supported.

I will now proceed to make a few notes on the coins represented in Plate II.

No. 1. is a coin of Samanta Deva. Obverse above bull *Srí Sam:* reverse horseman.
No. 2. is a coin of the same prince, with *Srí Samanta* above bull, reverse horseman.
No. 3. *Píthama.* Obverse Srí Píthama Chandra (Deva), reverse horseman.
No. 4. Ditto Obv. ditto., rev. do.
No. 5. Ditto. Obv. ditto., rev. do. Horse's neck ornaments shown and whole leg with pointed boot.
No. 6. *Apurvva.* Obv. Maharajah Srí Apurvva Chandra (Deva), rev. horseman plain and horse's eye visible.
No. 7. Ditto. Obv. Srí Apu(rvva) Chandra Deva Maharajah, reverse horseman.
No. 8. Ditto. Obv. Srí Apurvva Chandra, rev. horseman.
No. 9. Ditto. Obv. (Srí Apu)rvva Cha(ndra) Deva, rev. horseman.
No. 10. Ditto. Obv. bull, above which Srí Apu(rvva), rev. horseman.
No. 11. Rupa. Obv. bull, above which Srí Rupa Cha(ndra), rev. horseman.
No. 12. Obv. bull, above which Srí Rupa Chandra, rev. horseman. The horses of Nos. 10, 11 and 12, have beads round their necks.
No. 13. Apurvva. Obv. (Apurvva) Chandra Deva Maha(rajah), rev. horseman.
No 14. *Singára.* Obv. Mahárájah Srí Singára Chandra Deva, rev, horseman. Very poor.
No. 15. *Megha.* Obv. Maharajah Srí Megha Chandra Deva, rev. horseman.
No. 16. *Hari.* Obv. Maharajah Srí Hari Chandra Deva, rev. horseman. Neck ornaments and eye of horse visible.[*]
No. 17. Ditto. Obv. Mahárájah Srí Hari Cha(ndra Deva). The letters of the first line are all suspended from one line drawn across the coin as in Hindu letters. Rev. horseman. Head of horse, very much deteriorated.

(This king Hari soon after his accession tumbled into a well while out hunting. He was rescued after an interval of several days had elapsed. In that interval however he was accounted dead: his brother ascended the throne, and his wives mounted the funeral pile. When he came back he found Karmma reigning, and he went and took up his abode in the outskirts of his brother's dominions. I cannot account for Hari's coins being so plentiful. Out of several thousands I have seen, I have seen only one of Karmma, while at least one-fourth of the whole must have been Hari's. A Hari succeeded Triloka: perhaps these or at least some of them may be his coins although General Cunningham's list closes with Triloka.)

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[*] Since I wrote this article I have come across a coin of Harí हरी. The coin in the paper is of Hari हरि. Now in conversing a few days ago with General Cunningham on this matter I said that I was inclined to ascribe this rare coin to the king who was the brother of Karmma and who was hidden in a well for some days. He quite agreed with me. The coins of the paper which as I say are found in great numbers, would then resolve themselves into the coins of the king Hari who lived after Triloka, A. D. 1630-50, whose coins those of Hari resemble in make and letters.

No. 18. *Karmma.* Obv. bull, above which Srí Karmma, rev. horseman.

No. 19. *Sinsára.* Obv. Srí Sansára Chandra Deva, rev. horseman with a large flag on which is a peculiar mark.

No. 20. *Avatára.* Obv. Maharajah Sri Avatára Chandra Deva, rev. horseman.

(There is one coin of Devanga, the *god-bodied,* known; I gave one to General Cunningham.)

No. 21. *Narendra.* Obv. Maharajah Srí Narendra Chandra Deva, rev. horseman.

No. 22. *Dharmma.* Obv., in a square area which is surrounded by a circle of dots, Dharmma Chandra; rev., in a circle surrounded with a circle of dots, Durga Deví.

No. 23. *Triloka.* Obv. Maharajah Srí Triloka Chandra Deva. All the lines have the letters suspended from one line going across the coin. This coin and No. 3. are alike in this matter. Rev. horseman.

No. 24. Ditto. Obv. ditto without lines, each letter separate, rev. horseman. Hinder part of leg and thigh visible and hind-quarters and legs of the horse.*

The coins of Megha, Avatára Karmma and Dharmma are very rare. "The coins of Rupa, Singára, Sansára and Narendra are rare. Those of Pithama, Apurvva, Triloka and Hari are common. The Kángra types of Samanta Deva are very common."

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* Where the whole name is not on the coins, the part omitted is in brackets.

Note on an Inscription found upon a stone lying near the ruins of a Masjid on Lanka Island, Wular Lake, Kashmír.—*By* MAJOR H. S. JARRETT, B. S. C.*

The inscription which is in Persian, is as follows:—

این بقعهٔ چو بنیان فلک محکم باد   مشهورترین زیب در عالم باد
شه زین عباد تادر و جشن کند   پیوسته چوتاریخ خودش خرم باد

May this edifice be as firm as the foundations of the heavens,
May it be the most renowned ornament of the universe,
As long as the monarch Zayn Ibád holds festival therein
May it be like the date of his own reign,—"happy."

As is well-known the letters of the Arabic alphabet, like those of the Hebrew or Phenician and consequently of the Greek, are used as numerals, and the grouping of certain letters into a suitable word is frequently made to serve as a *memoria technica* among the Easterns to recall a date. In the above inscription, the numerical value of the letters in khurram (خرم happy) is 847 which is the year of the Hijra it is intended to record. This date is equivalent to A. D. 1443-4 during which Zayn-úl-Ąábidín (the Zayn Ịbád of the inscription—for both have the same meaning, *viz.*, ornament of the Adorers) ruled in Kashmír.

It may be interesting to glance cursorily over the events which preceded the accession of this prince from the period of the close of the last Hindu dynasty in the eleventh century of our era.

The Hindu history of that country has been discussed in a short Essay by Horace Hayman Wilson which will be found in the XVth Vol. of the Transactions of the Asiatic Society. He takes as his guide the first of the series of the Raja Tarangini, by Kalhan Pandit who commences his history with the fabulous ages and carries it down to the reign of Sangrama Deva the nephew of Didda Ráni in Sáka 949 or A. D. 1027 approaching to what Wilson considers to be the Pandit's own time Saka 1070 or A. D. 1148. The next two works of the series, *viz.*, the Rajavali of Jonah Raja and the Sri Jaina Rája Tarangini of his pupil Sri Vara Pandit, continue the record to the accession of Fath Sháh, which Wilson places in A. H. 882, but is given by Muhammad Áạzam author of the Persian history of Kashmír, as in A. H. 897 (A. D. 1491-2).

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* [A rubbing of this inscription was sent to the Society by Mr. Arch. Constable. The stone bearing the inscription is apparently a slab of black slate, well polished and finished, and measures 21½ by 12 inches and 2½ inches thick. The rubbing was taken on the 22nd September, 1874. The inscription, as shown in the rubbing, contains several inaccuracies; thus in the 2nd line زیب is wrongly spelled ذیب; the 1st and 4th lines have جو instead of چو, two dots being omitted apparently for want of space. ED.]

In the following survey I have followed the narrative of this last mentioned historian who calls himself the son of Khayr úz-Zamán and who commenced writing his history in the year 1147 A. H. (A. D. 1734-5) during the reign of Muhammad Sháh of Hindustán. His work follows the order of the Sanskrit and is divided into three periods, the first treating purely of the Hindu dynasties, the second of the Muhammadan, and the third of the subjugation of the country by the House of Timúr, with some concluding remarks on the features and curiosities of the country.

With the second period alone is this Note concerned, and the narrative is taken up at the accession of the last Hindu Rajah Sahdeo in A. H. 705 (A. D. 1305-6). During his reign occurred an irruption of the Turks under Zulju whose ravages left for generations the traces of his incursion. Forced to leave the country in the winter after a stay of eight months, the army, betrayed by guides, perished in the mountain snows. Many of the inhabitants of the country had fled in fear of their lives, some to Tibet, others, including Rajah Sahdeo, to Kishtwárah where he remained in hopes of some day recovering his crown. His General Rám Chand who had been among the fugitives returned to Kashmir with a refugee from Tibet named Rihjú to whom in former times he had accorded his protection. The country was now in a state of anarchy, each petty chief asserting his own independence. Rám Chand and his people occupied the fortress of Lár. Rijhú* or Rinjú (for the name is indistinctly written) seeing his opportunity gathered a few followers round him, made himself master by stratagem, of Lár, put Rám Chand to death and took his family prisoners. He now (A. H. 725 A. D. 1324) openly assumed the sovereignty, married the daughter of Rám Chand and won to his side the son of that Chief by granting him the government of Lár and Tibet and appointing him to a high command in the army. Though Buddhism was nominally the prevailing religion at this time, the country was distracted by the dissensions of sectaries, whose hostile and contending claims to religious truth perplexed the inquirer dissatisfied with the national religion. Such an inquirer was Rájá Rinjú, who after much perturbation of spirits and constant prayer, was led by divine inspiration—so runs the simple narrative—to watch a Moslem at his devotions. He saw, admired and believed, and soon led his court and people to embrace the Muhammadan faith. This monarch died in A. H. 727, after a reign of a little more than two years and a half, and the ruins of a once noble alms-house and a splendid mosque attest his reverence for the faith of his adoption. His widow Kotahrini† married Udayn Deo, brother of the last Rájá, who continued with his consort to carry on the government till the year A. H. 742, when he died. One of the Generals of the army coming of a royal stock, named Shahmír who, settling in Kashmír in the reign of Sahdeo as a merchant, had fast risen to place and power, now thought himself strong enough to marry the twice-widowed queen and to usurp the crown. She refused his overtures, but he made himself master of her person, and she was forced to yield a reluctant consent to the espousals. She, however, slew herself during the marriage festival and Shahmír now became undisputed master of the crown (A. H. 743 A. D. 1342-3) and assumed the title of Sultán Shams-u'd-dín. He died in 747 A. H. (A. D. 1346-7) leaving two sons, Jamshíd and Ali Sher.

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* The Rájataranginí has the name Rinchan.

† In the Rájataranginí Kotah Rani.

The reign of Jamshíd was short. He was defeated and slain in battle by his brother who succeeded him in 748 under the title of Alá-u'd-dín.

Alá-ud-dín's rule of ten years is marked by no important event. He died in A. H. 748 (A. D. 1356-8) and was buried at Alá-u'd-dínpúra.

His son Shaháb-u'd-dín succeeded to the crown on the death of his father. He employed his energies in clearing the country of rebels and marauders, and annexed Pakli, Dantaur and the tract, called the Sawád Kabír, to the crown. He wrested Tibet from the ruler of Káshghar and ventured to march towards India, then ruled by Firúz Sháh. After a campaign in which the victory was with neither party, peace was concluded on these conditions that the country from Sirhind to Kashmír should appertain to Shaháb-'ud-dín, while all to the eastward should acknowledge the sovereignty of Firúz Sháh. Muhammad A'ẓam* notes with surprise that this fact, which he says is mentioned by many historians, is left unnoticed by the author of the Táríkh-i-Firuz Sháhi. I may add that it is equally omitted by Elphinstone. (A. H 758, A. D. 1356-7.)

On his return to Kashmír, he built the capital of Shaháb-u'd-dínpúra of which now not a trace but the ruins of a mosque remain, and he destroyed the large idol temple at Bijárah.† In the year A. H. 778 (A. D. 1376-7) he died.

Ḳuṭb-úd-dín his brother succeeded him in A. H. 780 (A. D. 1378-9). He ruled with justice and moderation and was celebrated as a scholar and a poet. Ḳuṭb-úd-dínpúra commemorated his name and the metropolis of his kingdom. He died in A. H. 796 after a reign of sixteen years. During his time occurred the advent to the court of Sayyid Ali Hamadání, the sixteenth in direct descent from Ali-b-Abi-Tálib, the son-in-law of Muhammad. He was revered for his sanctity and eminent virtues, and his influence guided the counsels of the monarch. The Sayyid bestowed on him his own cap which Ḳuṭb-úd-dín wore in the royal crown. It is feigned that its efficacy secured the throne to the monarch's successors until the reign of Fatḥ Sháh who directed it to be buried with him, from which period dates the decline of the dynasty.

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* His son Muhammad Aslam, who is the authorof the History of Kashmír entitled the Gohar-i Aálam and has made considerable additions to his father's work, goes so far as to say that the conquests of Shahab-úd-dín were carried northwards beyond the Oxus and southwards beyond Lahore.

† Called also Bihárah or Bij Bihárah.

His son Sultán Sikandar, better known by the title of the Iconoclast from the number of idols he destroyed, assumed the sovereignty in A. H. 796 (A. D. 1393-4). During his reign, the rapid advance of Timúr on his march to India, induced Sikandar to conciliate the Tartar conqueror by despatching his son Sháhi Khán known afterwards as Zayn-u'l Aábidín to his court with presents and friendly letters. Timúr gratified by this conduct, left him in possession of his territory but detained Sháhi Khán in Samarkand which he never left until Timúr's death. Sikandar after a reign of twenty-five years and nine months, died in A. H. 822. A superb mosque which contained 372 columns, each 40 cubits in height and 6 in circumference, was begun and completed by him in the space of three years under the direction of two famous architects Khwajah Sudr-úd-dín Khorasáni, and Sayyid Muḥammad Nuristáni. To his piety was also owing the erection of the great mosque of Bijárah, and with the exception of the rattle of the royal kettle-drums, no profane music was permitted to disturb the austere tranquillity of his capital. Through his munificence the walls of the romantic gardens of Shalimar were extended as far as the Parganah of Phág and their stability was assured or blessed by the burial beneath their foundations of all the Hindu works that could be collected. As these treated either of idolatrous rites, astrology or history that was fabulous, they were considered by the monarch as condign objects for destruction.

He was succeeded by his son Ali who reigned but six years and nine months. This prince bent upon performing the pilgrimage to Mecca resigned his kingdom in A. H. 828 into the hands of his famous brother Zayn úl Aábidín and set out on his journey. A. H. 822. (A. D. 1419).

A H. 828. (A. D. 1424-5.) Zayn úl Aábidín was noted early in life for his abilities. He employed the time he had spent in Samarkand in adding to his store of knowledge, and on his return to his country he brought with him a number of artificers, such as paper-makers, book-binders, carpet-weavers, saddlers and others to improve the industries of his own land. His brother Ali having reached the territory of his father-in-law the Jammu Chief, was persuaded by him to abandon his pilgrimage and resume his sovereignty. Returning therefore with an army, he was met by his brother Zayn úl Aábidín, who gave him battle, defeated him and placed him in confinement wherein he shortly after died. The powerful faction of the Gurjis who in the time of his father possessed great influence in state affairs, and who favoured the cause of his brother, was exterminated by him at Naushahr, at which palace he erected a place for his own residence.

His time was now spent in promoting the prosperity of his country and in repairing the ravages of the irruption of the Turks under Zulju which the lapse of more than a century had not yet been able to efface. He was a liberal patron of men of letters and encouraged the progress of the arts, especially favouring the artificers whom he had introduced from Samarkand. He travelled much over his dominions and his Hindu and Muhammadan subjects lived at peace with each other undisturbed by religious dissensions, which if they arose were amicably settled by punchayets at which the monarch himself would preside. This conduct gained for him the title of the Great King.

According to tradition in the vicinity of the Wular lake once stood a city of which the Rájá was Sudrasen. By reason of the enormity of his crimes, the waters of the lake rose and drowned him and his subjects. It was said that during the winter months, at low water, the ruins of a submerged idol temple might be seen rising from the lake. Zayn úl Aábidín constructed a spacious barge which he sank in the lake and upon which he laid a foundation of bricks and stones till it rose high enough to be level with the water. Upon this he erected a mosque and other buildings and gave the islet the name of Lanka. The expense of the work was defrayed by the fortunate discovery of two idols of solid gold which had been brought up from the lake by divers. On the completion of Lanka the king ordered a great festival to be held wherein great sums were distributed amongst the poor. Verses were written by the poets to commemorate this event, and among these the inscription under notice by Ahmad Allámah Kashmíri was engraved upon a stone and placed above the Mihráb or sanctuary of the mosque. This Ahmad Kashmíri was the author of the Núrnáma, a Persian translation made in the time of Zayn úl Aábidín of an ancient History of Kashmír in the Kashmirian language by Shaikh Nur-úd-dín Wali. His translation was made use of by Muhammad Aslam the son of Muhammad Áẓam, in amending the omissions of his father's History. Mention of the slab with its inscription is made by Muhammad Áẓam who gives a faithful transcript of the verses Muhammad Aslam states that he visited Lanka in 1167 A. H. (A. D. 1753) and observing the inscription carried it in his memory and records it in his work. His second line runs thus—

مشهور به زیب و زین در عالم باغ

which shows that either his memory failed him or he was unable to decipher the line more correctly given by his father.

The further history of Zayn úl Aábidín it is perhaps unnecessary to record. He died in A. H. 880 (A. D. 1475) and was succeeded by his son Hydar Sháh. His tomb may still be seen below the Zayna Kadal, the fourth of the thirteen bridges that span the river Jhelam in its course through the valley of Kashmír.

Coins of the Sunga or Mitra Dynasty, found near Rámanagar or Ahichhatra, the ancient Capital of North Panchála, in Rohilkhand:—the property of H. RIVETT-CARNAC, ESQ., C. I. E., F. S. A., &c. *Described by* A. C. CARLLEYLE, *of the Archæological Survey of India.*

(With a Plate.)

The great ruined site of *Ahichhatra*, the ancient capital of North Panchála and now known as *Rámanagar*, has of late been yielding a plentiful supply of the coins of the Sunga or Mitra dynasty. Mr. H. Rivett-Carnac has been so fortunate as to procure a considerable number and variety of these coins from that find-spot, and he kindly placed them in my hands for examination and identification.

The fact of so many coins of this dynasty having been found so far to the north-west from their proper capital city, Pushpapura (or Pataliputra), may perhaps be held to be a proof of the wide extent of their sway. While making some excavations at Bhuila, the site of the ancient city of Kapilavastu, in the Basti district, I obtained a considerable number (probably about a hundred) of the coins of the Mitras, dug newly from the soil, in deep excavations, while I was present on the spot; they were mostly of Agni Mitra and Indra Mitra, with a few of other later kings of this dynasty. These coins were mostly of small size; but the coins obtained by Mr. Rivett-Carnac, from Rámanagar, are mostly of the largest size, with three or four only of the smallest size.

About one hundred and ten of these coins, belonging to Mr. Rivett-Carnac, have passed through my hands; and of these, several bear names of kings which are either new, or of rare occurrence, such, for instance, as *Bhadraghosa*, *Phagúni-mitra*, *Surya-mitra*,[*] and *Anu-mitra*,—besides several coins of *Bhánú-mitra*, which were already known. The most numerous coins were those of Bhúmi-mitra, and the next numerous were those of Phaguni-mitra,—after whom, in the descending scale of number, followed Agni-mitra, Bhánu-mitra, Surya-mitra, Bhadra-ghosa and Indra-mitra; with also a very few, from other localities, of the later kings, whose coins are of quite a different type, such as Vijaya-mitra, Jaya-mitra, Satya-mitra and Saya-mitra.

From the numerical proportion in which the coins of various kings are found in a hoard, we can generally make a pretty good guess as to who were the earliest, and who the latest, of the series. Thus, the king of

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[*] [This name was at first read *Srayan-mitra* by the author. General A Cunningham first suggested the true reading *Suya* or *Surya-mitra*; see Proceedings As. Soc. Beng., January 1880; see also below p. 28, Ed.]

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whom the greatest number of coins are found in a hoard, may be accepted as being either the latest, or the contemporary king, of the dynasty, at the time when the hoard was buried or lost; while the king of whom the fewest and most worn coins are found may be accepted as the earliest, in point of time, of the series. But a similar numerical proportion of coins of different kings may, sometimes, also have been brought about by accidental circumstances; and therefore we must, in all cases, be guided by the older or later forms of the alphabetic characters, which appear in the legends on the coins.

But if we follow the rule enunciated above, in a general sense, with sufficient judgment and discrimination, we may apply it in the present case. Thus, as the coins of Bhúmi-mitra are the most numerous, in proportion, in the hoard found at Rámanagar, we may suppose that he was the latest king of the dynasty, at the time when the hoard was buried, and that the hoard was buried during his reign.

In like manner, as the coins of Phaguni-mitra are the next in point of number, to those of Bhúmi-mitra,—or in fact nearly equalling them,—and were, at the same time, far in excess of the coins of any of the other kings, we may conclude that Phalguni-mitra, was the immediate predecessor of Bhúmi-mitra.

The coins of Agni-mitra and Bhánu-mitra follow next behind, in numerical proportion. But as the coins of these two kings are nearly equal in number, it becomes difficult to decide which of them was prior to the other. There is, however, one marked distinction about the coins of Bhánu-mitra and that is, that the central symbol, of the three symbols above the name, is always punched into the coin, with a square punch; and the symbol in this square punch-mark depression is generally a repetition of the raised symbol to the right of it; while on the coins of other kings, the central symbol is generally different from either of the other two. Now this central square punch-mark depression I have also found on a few coins of *Surya-mitra*, who, from the greater rareness of his coins and the rather more antique form of the alphabetic characters of the legend, I consider to have been a predecessor of Bhánu-mitra,—and from these two kings' coins having the square punch-marked depression in common, I should say that Bhánu-mitra must have been the immediate successor of Súrya-mitra. Agni-mitra must therefore be of later date, and should probably follow immediately after Bhánu-mitra.

The coins of Bhadra-ghosa are the fewest and the most scarce of all. And the alphabetic characters of the legend, are of an older type than on any of the other coins, and more nearly approach the forms of the old Laṭ character of Aṣoka. Moreover the large coins of Bhadra-ghosa are very much worn, so much so that the legend is blurred and indistinct.

But Mr. Rivett-Carnac has one most beautiful little coin of Bhadraghosa, of very small size, on which the legend is as clear and distinct as possible,—really wonderfully clear for such a small coin.

The occurrence of only one undoubted coin,—besides one doubtful one,—of Indra-mitra, in this collection, is somewhat puzzling to me,—because, from the style of the alphabetic characters on his coins, I do not think they are so ancient as those of some of the other kings; and I would be inclined to place him certainly after Agni-mitra. The only reason that I can offer for this comparative (and perhaps only apparent or local) scareeness of the coins of Indra-mitra, is that his reign may have been a short one, and either that his residence was in some different part of the country, or that the distribution of his coinage was partial I did not find that the coins of Indra-mitra were any more scarce than those of other kings, among the coins of this dynasty which I obtained at Bhuila (Kapilavastu).

But, in the present case of the Rámanagar coins, I think there may be another way of accounting for this, probably merely temporary or local, scarceness of Indra-mitra's coins. I would suggest that Indra-mitra was the son and immediate successor of Bhúmi-mitra, and that the Rámanagar hoard was buried immediately after the death of Bhúmi-mitra, and in the early part of the first year of the reign of Indra-mitra. This would account for the plentifulness of Bhúmi-mitra's coins, and the scarceness of Indra-mitra's, in the Rámanagar find.

I will now give a list of those Mitra kings whose names have been in any way authenticated; and I will place them in the chronological order in which I think they should be placed; and opposite to the names of those of whom coins were found in the Rámanagar hoard, I will place the number of each found, respectively.

Initial Date.	Names of Kings.	Number of *Coins* found at Rámnagar.
B. C. 178.	Pushpamitra, ...	(*None.*)
	Bhadraghosa, ...	5
	Surya-mitra, ...	7
	Bhánu-mitra, ...	10
	Agni-mitra, ...	11
	Anu-mitra, ...	1
	Phaguni-mitra, ...	28
	Bhúmi-mitra, ...	34
	Indra-mitra, ...	1, *certain.* 1, *doubtful.*

I will now proceed to give a detailed description of the coins themselves, see Plate III.

I.—BHADRAGHOSA.

1. Coin, very small.

Obverse.

A square depression, caused by a die, containing the legend, with three symbols above it,—Bodhi Tree, Linga, and Serpents.

Legend—Bhadraghosasa.

Reverse.

A curious dumpy figure, as broad as long, of Buddha standing teaching.

2. Coin, large.

Obverse. A square depression, containing the Legend, with three symbols above it.

Legend—Bhadraghosasa.

(Note.—The three symbols above the legend are, to the left a Bodhi Tree standing on a square base or in a square railing;—in the centre, a linga guarded by two serpents (Nágs) which rise up on each side of it— ; to the right, two serpents intertwined, forming a circular knot in the centre, with their two heads extending out, right and left, above, and their two tails extending out, right and left, below. This same description will apply to all other coins bearing these symbols.)

Reverse.

Two objects, not distinct.

II.—SURYA-MITRA.

3. Coin, middle-sized, pretty large.

Obverse.

In a square depression, the legend, with three symbols above it.

Legend—Surya-mitrasa.

Symbols above legend :—To left, Bodhi Tree, as before. To right, two serpents intertwined, as before. In centre, a square punch-marked depression, containing a symbol, which appears to be composed of several snakes intertwined.

Reverse.

Device indistinct. (But, on another coin, it appears to be the symbol of Sangha with the Buddhist Wheel of the Law, below it.)

4. Coin same size as the former.

Obverse.

In a square depression, the legend below, with three symbols above it.

Legend—Surya-mitrasa.

Symbols above the legend:—To left, Bodhi Tree, as before. To right, two serpents intertwined, as before. In centre, linga guarded by two serpents (Nágs) whose heads rise above it on each side.

Reverse.

Apparently the symbol of Sangha, with the Wheel of the Law of Buddha. (This was referred to, in describing the previous coin, the reverse of which is defaced.)

III.—BHÁNU-MITRA.

5. Coin pretty large.

Obverse.

In a square depression, the legend below, with three symbols above it.

Legend—Bhánu-mitrasa.

(Sometimes the last part of the name appears to be *mitrasa.*)

Symbols, above the legend. To the left, the Bodhi Tree, as before. To the right, two serpents intertwined, as before. In the centre, a square punch-mark depression, containing a symbol composed of four snakes intertwined, and forming a squarish shaped figure.

Reverse.

The symbol of Sangha surmounted by the Wheel of the Law of Buddha. But it is possible that it may be intended for a figure of the Sun *(Bhánu)* placed above a pedestal.

IV.—AGNI-MITRA.

6. Coin, large.

Obverse.

In a square depression, the legend below, with three symbols above it.

Legend.—Agimitasa.

Symbols above legend. To left, Bodhi Tree, as before. To right, two serpents intertwined, as before. In centre, Linga, guarded by two serpents (Nágs), one on each side.

Reverse.

Figure of Buddha standing, with right hand raised, and rays radiating from his head. He stands on a Buddhist Railing, between two trees.

7. Coin, middle-sized, rather small.*

Obverse.

Legend and *symbols* the same as in the preceding.

Reverse.

Buddha standing, with right hand raised, and flames ascending from his head and shoulders. He stands on a sort of ornamental pedestal, probably representing the Lotus.

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* [This is a mistake; coin No. 7 in the Plate is not one of Agni-mitra, but of Bhúmi-mitra, like No. 10. By a mischance the wrong coin seems to have been sent to be figured; ED.]

V.—ANU-MITRA.

8. Coin, very small.

Obverse.

Surface of obverse of coin, concavely depressed. Legend in a line below. Three symbols in a line above.

Legend—Anu-mitasa.

Symbols, the same as on the coins of Agni-mitra.

Reverse.

A Buddhist Railing. Above it, a large round ball, surrounded by a circle of dots. On each side below, a small round ball, with a curved semicircular figure below it, the concavity of the curve being turned downwards; these two latter symbols resemble in shape the later modified old Indian form of the letter "T", just preceding the Gupta period. I think the central symbol above (namely the round ball surrounded by a circle of dots) may be intended to represent the Sun.

VI.—PHAGUNI-MITRA.

9. Coin large.

In a square depression, the legend below, with three symbols above it.

Legend—Phagúni-mitrasa.

Symbols, above the legend. To left, Bodhi Tree standing on a square pedestal. To right, two serpents intertwined. In centre, a Linga, with two serpents (Nágs) twined round it, their hoods raised up on each side of it.

Reverse.

Buddha standing on a lotus, with a canopy over his head.

VII.—BHÚMI-MITRA.

10. Coin, large.

Obverse.

In a square depression, legend in one line below, with three symbols in a line above.

Legend—Bhúmi-mitasa.

Symbols, Bodhi Tree, Linga with serpents (Nágs), and two serpents intertwined in a knot,—as on the coins of Phaguni-mitra and Agni-mitra.

Reverse.

Buddha standing between two trees, on a Buddhist Railing. Rays or flames ascend from the head of Buddha.

VIII.—INDRA-MITRA.

11. Coin, rather small.

Obverse.

Legend and three symbols in a square depression, as on the other coins.

Legend.—Indra-mitasa.

Symbols, the same as on the two preceding coins.

Reverse.

A squat figure of Buddha, above a Buddhist Railing.

(*Note* :—The legend on some other coins of Indra-mitra, which I have seen, appeared to read simply as "Inda-mitasa," while on a few it seemed to have the still more mutilated form of " Ida-mitasa."

SUPPLEMENTARY NOTE.

Since my Paper on the coins of the Sunga or Mitra Dynasty was forwarded to the Asiatic Society of Bengal, I have seen in the collection of Mr. Rivett-Carnac, another apparently unique coin of a king of this dynasty called *Ayu-mitra*, which I believe to be a new name. This king must have been one of the latest of the dynasty, as the letters of the legend belong to the later Gupta period.

Description.

Coin, round, middle sized, copper.

Obverse. Bull.

Inscription, underneath, A-yu mi-ta-sa.

Reverse. Apparently a Peacock and Palm-tree ?

The legend on this coin is clearly and distinctly just as I have given it above, and there can not be any doubt whatever about it. This coin therefore must not be confounded with the common, though similar, coins of Saya-mitra, with which I am well acquainted.

In order to complete the list, I may mention that I have heard from General Cunningham that he has a coin of a king of this Dynasty named Dhruva-mitra. But as I have not seen General Cunningham's coin and therefore I do not know its age, I can not tell where to place Dhruva-mitra in the line of succession. But no doubt General Cunningham will describe the coin himself.

With the sole exception of the last named king, I think I feel pretty certain of the place which the rest of the Mitra kings respectively should occupy in the order of succession. We now know of fourteen kings of this dynasty, and I would place them as follows :—

1. Pushpa-mitra.
2. Bhadraghosa.
3. Surya-mitra.
4. Anu-mitra.
5. Bhânu-mitra.
6. Agni-mitra.
7. Phâguni-mitra.
8. Bhûmi-mitra.
9. Indra-mitra.
10. Vijaya-mitra.
11. Satya-mitra.
12. Saya-mitra.
13. Ayu-mitra.

The fourteenth king would be General Cunningham's Dhruva-mitra ; but not having seen the coin, I can not tell in what position to place him.

Of course I have never seen any coin of Pushpa-mitra ; but he is nevertheless sufficiently authenticated otherwise ; but I have seen and examined coins of all the remaining twelve kings.

With regard to the name *Surya-mitra*, I may now state that I have since seen several other coins of this king, and that the result of my examination of these other and more perfect specimens is that the name must be read *Suya* or *Surya* Mitra ; and in this I agree with General Cunningham. On most of these coins the name appears to read as *Suya*, with a dot (anuswara ?) above the *y* ; but on at least one coin, the name reads clearly as Surya, the *repha* appearing quite plainly on the top of the *y*.

Coins of Ghiás-ud-dín and Mu'az-ud-dín bin Sám.—*By* C. R. STÜLPNAGEL, M. R. A. S.

(With a Plate.)

The extracts from the Tabakát-i-Násirí made by Sir Henry Elliot in his History of India contain but little information concerning Ghiás-ud-dín of Ghór, nor is this want of details much to be regretted except for the fact that the coins obtained hitherto generally join the name of this ruler with that of his younger brother Mu'az-ud-dín who is looked upon as the first Pathán king of Delhi. It is stated that when 'Alá-ud-dín Husain, surnamed Jehánsoz, ascended the throne of Fíróz-kóh, he imprisoned his two nephews Ghiás-ud-dín Muhammad Sám and Mu'az-ud dín Muhammad Sám in a fort of Wahíristán, and settled an allowance for their maintenance. He took Ghazní, but did not make it his permanent residence. After his death he was succeeded by his son Sultán Saif-ud-dín. This king released the two princes, his cousins, of whom Ghiás-ud-dín dwelt peacefully at Firoz-koh, taking service with the Sultán Saif-ud-dín, whereas the more adventurous Prince Mu'az-ud-dín proceeded to Bámián and there found employment under his uncle Fakhr-ud-dín Mas'úd. But when Ghiás-ud-dín succeeded to the throne of Ghór after Saif-ud-dín's tragical death, Fakhr-ud-dín instigated his nephew Mu'az-ud-dín to bestir himself and likewise acquire a regal position. The latter accordingly started in all haste to his brother's court where he was received in a friendly spirit. He served Ghiás-ud-dín one year, after which the countries of Kasr-kajúrán and Istiya, between Herat and Ghazní, were assigned to him; and at a subsequent period he obtained possession of the city Takínábád, specially noted as the largest town in the Garmsír. In 569 A. H. (1173 A. D.) Sultán Ghiás-ud-dín conquered the town of Ghazní, but returned to Ghór after placing his brother Mu'az-ud-dín upon the throne, who secured in addition the territories of Ghazní and the country round about in 570 A. H. In the third year after this time, Mu'az ud-dín led his forces to Multán, and henceforth his history becomes merged in that of India. Of Sultán Ghiás-ud-dín scarcely anything more is known, but it should be remembered in his favour that, instead of getting his brother murdered, he treated him with the greatest kindness, and always associated his name with his own on the coins of the realm. Ghiás-ud-dín died at Herát in 599, and Mu'az-ud-din was murdered by the Gakkars at Rohtak in 602 A. H.

Coins in the joint names of Ghiás-ud-dín and Mu'az-ud-dín have already been published by Mr. Edward Thomas in his "Chronicles of the Pathán Kings of Delhi," two of which are of gold and two of silver, the latter being ingraved in the first plate and numbered one and two, the latter being identical with the one described by Wilson in the *Ariana Antiqua*, pl. XX, 29. I have lately acquired eight specimens of dirhems of these Ghori brothers, all of them different from those already described. Of these, three are similar to No. 1, pl. I of Mr. Thomas's book; see Plate IV. They are of silver weighing, on an average, 74 grains and have their legends arranged in three concentric circles, the patronymic occupying the centre. The first, however, differs in this that the outer circle containing the date (597) is found in the *obverse* with the name and title of Ghiás-ud-dín, and not on the reverse as on Mr. Thomas's coin. I thought it at first just possible that the engraver might have committed a mistake, and changed the outer circles of the obverse and reverse, but such a supposition is unlikely from the transcript of the coin in the body of the book, which clearly shows that the date belongs to the reverse. Moreover it is totally immaterial on which side the date is actually placed, and it is actually found on the reverse together with Mu'az-ud-dín's name, on two of the coins described in the sequel of this paper. Although the margins are both a little abraded, they can with ease be supplied from the next coin. I may, however, remark that this coin could not have contained the name of the month of the year, as there is not sufficient space for its insertion.

The following is the transcript:

Date 597.

Obverse.

• • الدرهم في • • سنه سبع و تسعين و خمس مایة	First circle.
لا الله الا الله محمد رسول الله السلطان الاعظم	Second circle.
غياث الدنيا و الدين ابو الفتح	Third circle.
محمد بن سام	Centre.

Reverse.

هو الزی رسل رسوله بالهدي و دين الحق ليظهره • • •	First circle.
الناصرلدين الله السلطان المعظم معز	Second circle.
الدنيا و الدين ابو المظفر	Third circle.
محمد بن سام	Centre.

The last two of the three coins with concentric inscriptions referred to above, differ from the first in this that they have the arrangement of date just as in the Thomas's pl. I, No. 1; *viz.*, the date (596) is placed on the reverse containing the name of Mu'az-ud-dín. The size, however, is smaller, and the letters less bold. The *Ariana Antiqua*, pl. XX, 35 is probably a similar coin to my two; but as Wilson, owing to the worn condition of the coin in his possession, was unable to describe it, I include it in this paper. The outer circle of the obverse contains the Súrah common to all Ghori coins; the second has half the Kalima, which is afterwards continued in the second circle of the reverse; and the third circle and centre show the names and titles of Ghiás-ud-dín. The reverse has in the first or marginal circle the place of mintage and the month and year in which the dirhem was struck. Part of the second and the third circles and the centre, like those of the obverse, contain the titles and names, but of Mu'az-ud-dín.

Ghazni, month Zi-ul-hajja, A. H. 596.

Obverse.

هو الزی رسل رسوله بالهدی و دين الحق ليظهره علی الدين كله ولو First circle.
كره المشركون

لا اله الا الله الناصر لدين الله السلطان الاعظم	Second circle.
غياث الدنيا و الدين ابو الفتح	Third circle.
محمد بن سام	Centre.

Reverse

ضرب هذا درهم في بلدة غزنه في ذى الحجه سنه ست و تسعين خمس ماية	First circle.
محمد رسول الله السلطان المعظم معز	Second circle.
ادنيا و الدين ابو المظفر	Third circle.
محمد بن سام	Centre.

The other five coins have never been described before, as far as I know, and are quite of a new type. They were obtained from an itinerant Kabuli who was very shy in speaking of the place where they had been originally procured; but as in his conversation he said that he had been in Ghazni and Kabul, and had lately come to Lahore by way of Jellalabad, it may be reasonably presumed that they were not found in the Panjáb, but in the Kabul valley, or perhaps in or near Ghazni. All of these coins are likewise binominal. The weight is between 56 and 79 grains. The area on either side is a square composed of double lines, with the inscription arranged in five lines. The enclosing margin is of course in four sections. It is bounded by double circles. The margins are partially abraded, but fortunately one coin is sufficiently well preserved and the following inscription can be therefore made out with accuracy:

Dates 597 and 598.

Obverse.

Area :—
لا اله الا الله
محمد رسول الله
السلطان الاعظم
غياث الدنيا و الدين
ابو الفتح محمد بن سام

Margin :— هو الزى رسل رسوله بالهدى و دين الحق ليظهره على الدين كله

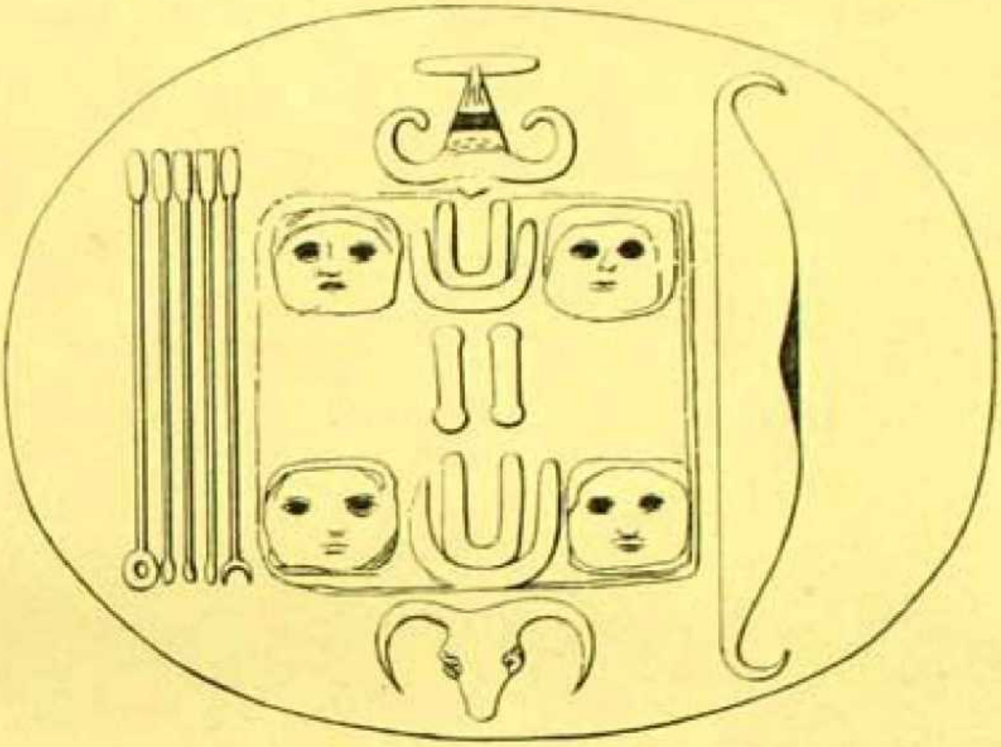
Reverse

Area :—
الناصر لدين الله
السلطان المعظم
معز الدنيا و
الدين ابو المظفر
محمد بن سام

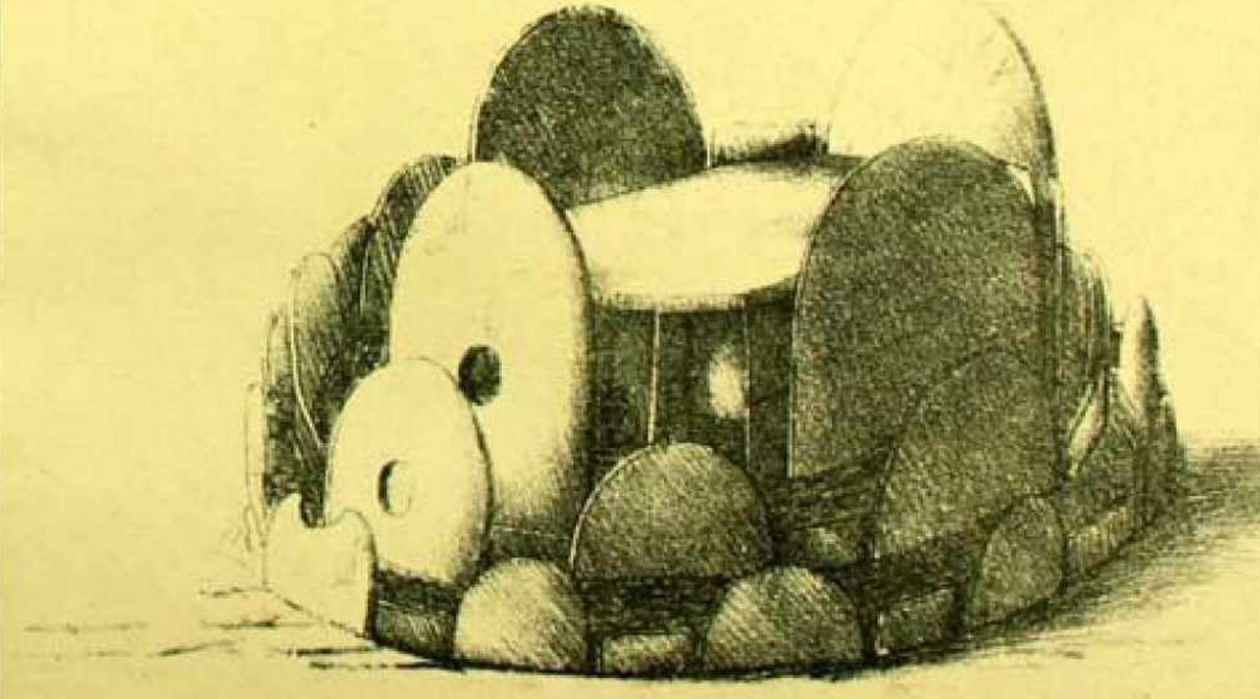
Margin :— ضرب هذا الدرهم في شهور سنه ثمان و تسعين و خمس ماية

Of these five dirhems, four have the date on the reverse together with the name of Mu'az-ud-dín, and one on the obverse. None contains the place of mintage.

All these coins, bearing evidence to the joint rule of the two brothers, are dated 596, 597 and 598 A. H., and must have been issued towards the end of their reigns, for Ghiás-ud-dín died in 599 and his brother three years afterwards. Comparing the titles of the two sons of Bahá-ud-dín Sám, the elder, Ghiás-ud-dín, is always called "ul'azam" the greatest, Sultán, ul nasr-l-dín illah and abúl fath, whereas to his younger brother are applied mu'azm, "great," Sultán, nasr-l-dín and abúl muzafr. It was only after the death of Ghiás-ud-dín that Mu'az-ud-dín called himself by the higher sounding title of 'azam.



Rudely sculptured (sacrificial) stone, lying before Temple of Kamala-kanni-y-amman at Chenji or Sanji-kottai ("Gingee") S. Arcot.



Rude sepulchral monument of stone slabs at Iralabanda—Bôyanattam, in North Arcot District of Madras. Restored slightly.

F. R. Brandt, del. Lith. & Printed by [illegible]

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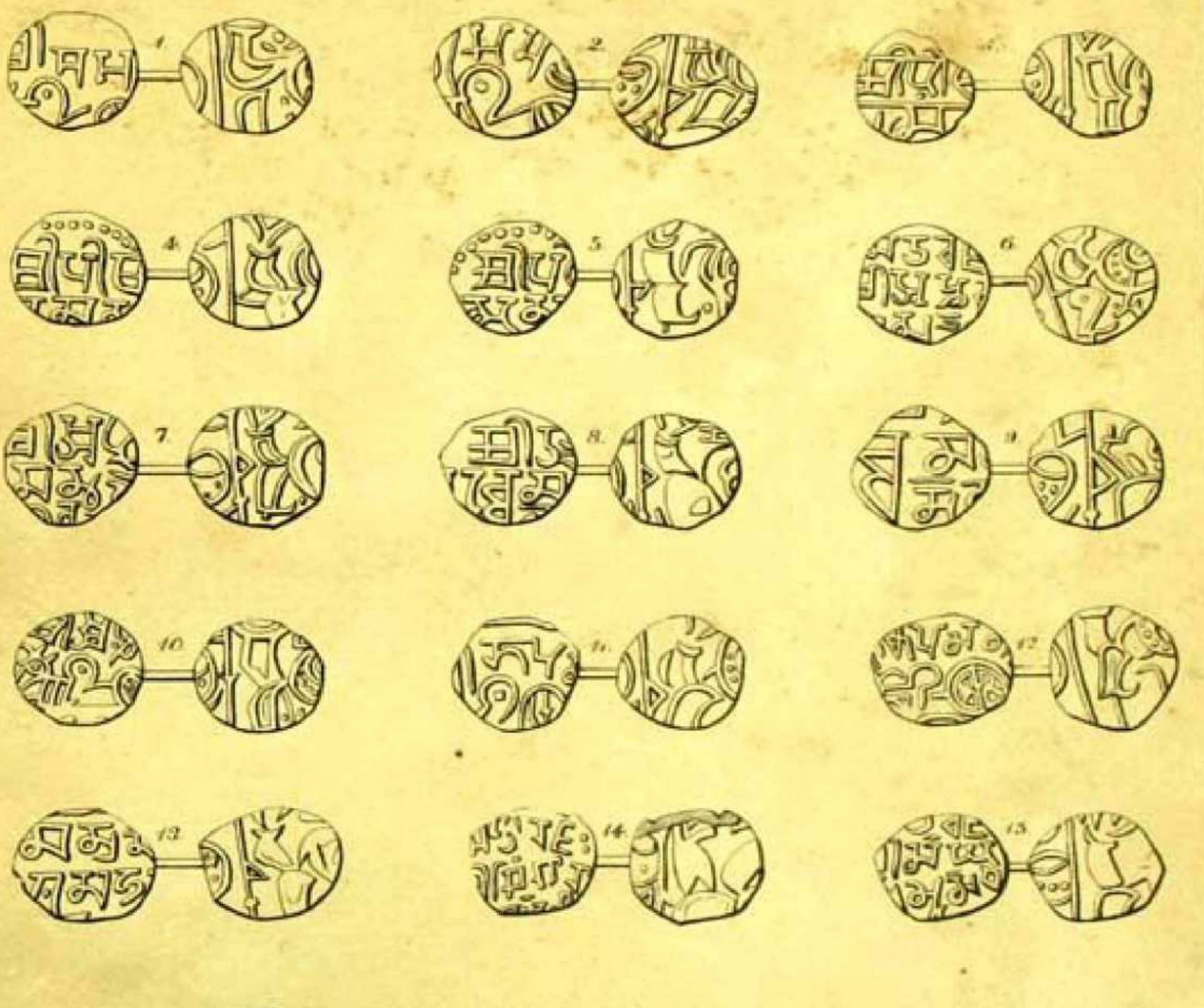

Chas J. Rodgers del.

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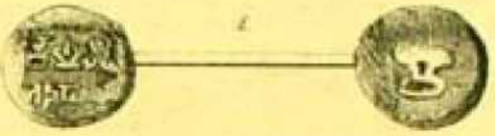
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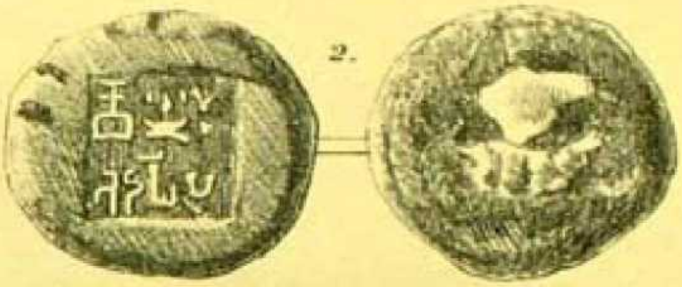
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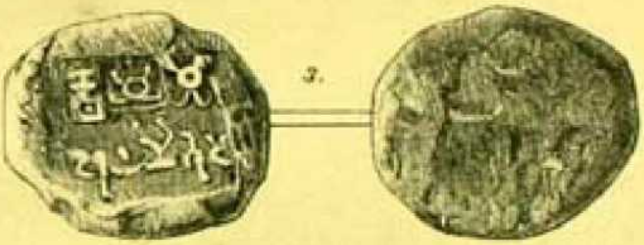
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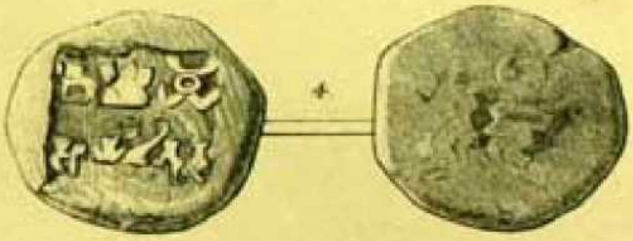
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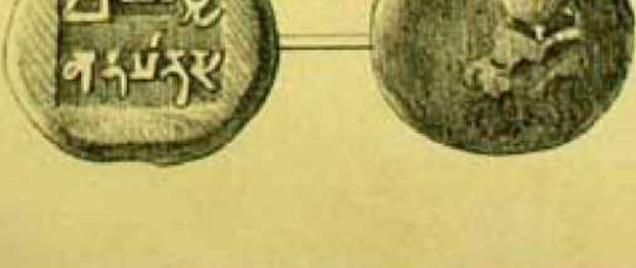
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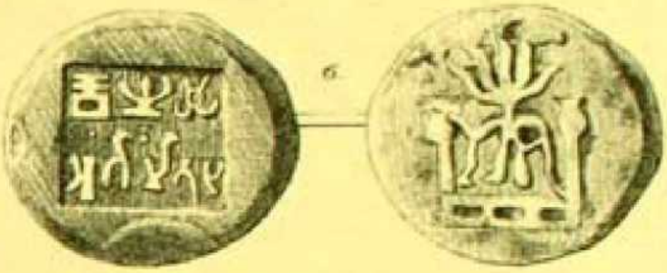
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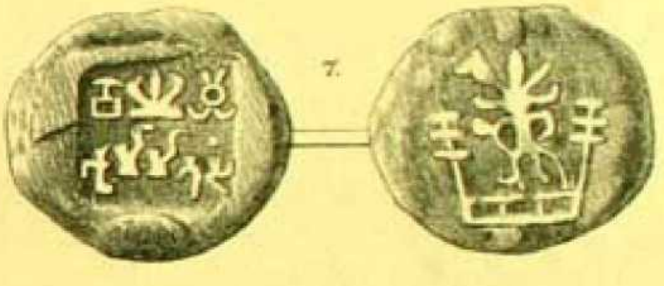
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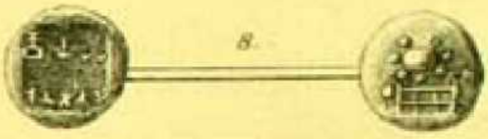
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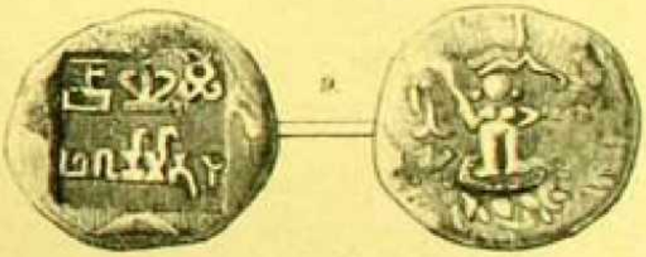
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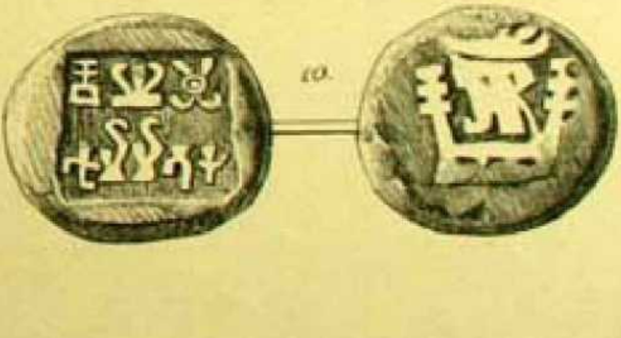
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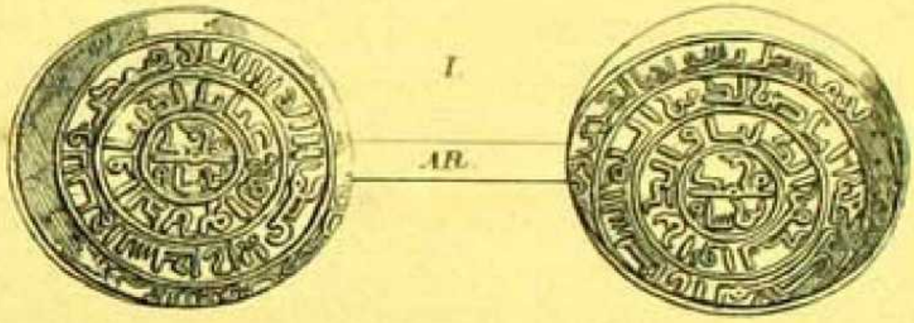
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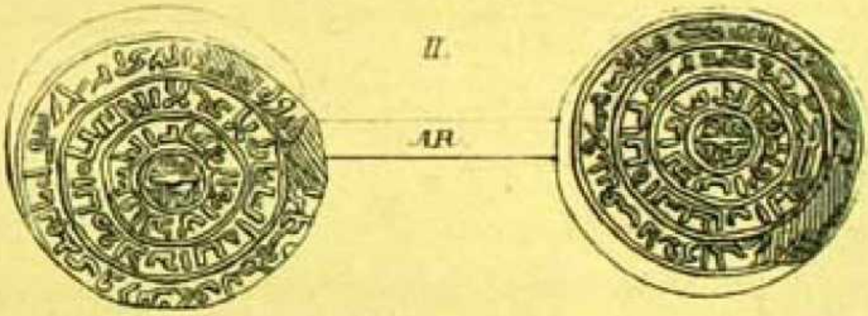
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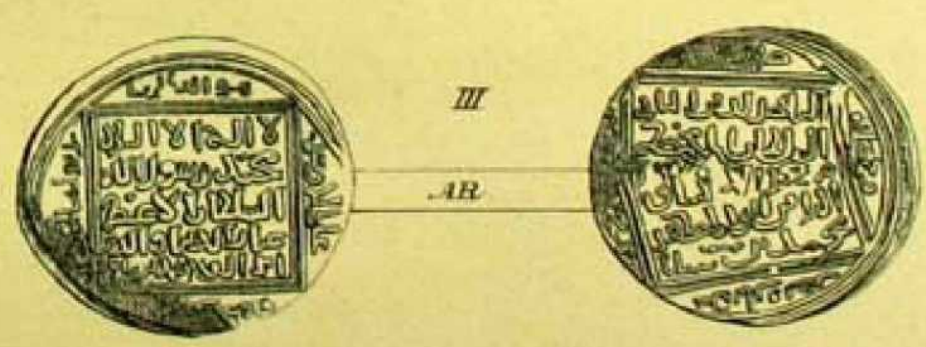
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(Nos. I TO IV.—1879: with 19 Plates and 2 Maps.)

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> "It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease." SIR WM. JONES.

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ERRATA.

J. A. S. B., Pt. I, Vol. XLVI, p. 231, line 23, *Dele* 'Jains and.' This error was due to a misreading of an ill-written Urdu manuscript.

Ibid. p. 231, line 1, *for* '1730 A. D.' *read* '1721 A. D.' and in line 2 *for* 'son' *read* 'chela.' In both these instances I was misled by the Gazetteer. For the corrections I am indebted to Mr. Irvine in J. A. S. B., Vol. XLVII, Part I, pp. 286 and 367.

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Errata in Vol. XLVIII of Journal.

Page 273, line 10, *for* 'darjáh' *read* 'dargáh.'
" 273, " 13, *for* 'Bíjay' *read* 'Bijay.'
" 273, " 13, *for* 'Dasaráth' *read* 'Dasarath.'
" 273, " 33, *for* 'name' *read* 'namo.'
" 275, " 1, and 5, *for* 'Indrapúrá' *read* 'Indrapura.'
" 275, " 10, and 15, *for* 'Hastinápúr' *read* 'Hastinápur.'
" 275, " 13, *for* 'Sárdhana' *read* 'Sardhana.'

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A Collection of Hindí Roots, with Remarks on their Derivation and Classification.—*By* DR. A. F. RUDOLF HOERNLE.

This Collection was prepared by me some years ago and was originally intended to form part of my Comparative Grammar of the Gauḍian Languages, and to illustrate the Chapter on Roots. The present introductory remarks give the substance of that chapter.

The Hindí, like any other language, possesses roots. By this term I here mean the constant element in any series of sense-related words. Thus in the Hindí words *bol-í* "speech," *bol-áhaṭ* "calling," *bol-aná* "speaking," *bol-á* "spoken," *bol-ai* "he speaks," &c. the constant element *bol* is the root; the remainder are suffixes and vary according to the meaning which is to be expressed by means of the root.

A root may be determined in Hindí, or for that matter in any Gauḍian language, by detaching the suffix of the 3rd person singular present *ai* (or *e*) from the word, when the remainder will be the root. Thus in *bol-ai* "he speaks," *kar-ai* "he does," *bújh-ai* "he understands," *bol*, *kar* and *bújh* are the roots respectively.

For comparing Hindí roots with Sanskrit, this is the most convenient rule. For a large number of Hindí roots are not derived from the pure Sanskrit root, but from that modified form of it, which is confined to the present tense (or the so-called special tenses generally). Thus the Sanskrit root *budh* "understands," takes the form *budhya* in the present tense, whence arises the Hindí form *bújh*. From the Sanskrit *budh* comes the 3rd person sing. present *budhyate*, in Hindí *bújhai*; but from it comes also the participle future passive *boddhavya* "to be understood"; in Eastern Hindí this form is *bújhab* or *bujhib*, Western Hindí *búјhibau*, which transliterated into Sanskrit would be *budhyitavya*. This shows that in Hindí the form *búјh* acts as a root, precisely as *budh* does in Sanskrit.

Putting aside mere phonetic differences, as in the Hindí *sikh* or *síkh*, Maráṭhí ṣik "learn," Eastern Hindí *char*, Western Hindí *chal* "walk," the Gauḍian languages differ very little with regard to their roots. There are, however, a few exceptional cases of roots which are confined to some particular Gauḍian language. Thus "see" is in Sindhí *pas*, Maráṭhí *páh*, but in Hindí *dis* or *dekh*, the Sanskrit *paṣ*, *preksh* and *dṛiṣ*; again "come" is in Sindhí *ach*, Bangálí *ãis* or *ás*, but in Hindí *áv* or *á*, the Sanskrit *ágachh* and *áyá*.

Roots, as a rule, do not undergo any change, when entering into conjunction with suffixes; except in the formation of the Causal Verb, in which case a long vowel is always shortened; thus *bol-aná* "to speak," but *bul-áná* "to call"; *chhoṛ-aná* "to loose," but *chhuṛ-áná* "to cause to loose"; *ghúm-aná* "to turn," but *ghŭm-áná* "to cause to turn"; *pí-ná* "to drink," but *pĭ-láná* "to cause to drink", &c. There are, however, a few exceptional cases of changeable roots. These are *kar* "do," *dhar* "place," *já* "go," *le* "take," *de* "give," *mar* "die." These roots assume a considerably different form in the formation of the past participle and past tense; *viz.*, the first five become *ka* or *ki*, *dha* or *dhi*, *ga* or *gi*, *la* or *li*, *da* or *di* respectively, and *mar* becomes *mu*. The regular, unchanged forms, however, also occur, and generally these three forms are peculiar to some one or other of the Hindí dialects. Thus the High Hindí has the past participle *ki-yá* "done," Eastern Hindí *ka-il* or *ka-yal*, but Western Hindí *kar-au*; Eastern Hindí also has the radical form *ki* in *ki-his* "he did," *ki-hin* "they did."* So also High Hindí *mu-á* or *mar-á* "dead," Eastern Hindí *mu-il* or *mu-al*.

Roots, when determined as above explained, may be divided into two classes, primary and secondary. To the former class belong all those roots, the originals of which, though sometimes more or less disguised by subsequent phonetic modifications, exist in Sanskrit. Secondary roots are those, which have no Sanskrit original, though their origin can be traced to Sanskrit elements. Thus the Hindí root *khá* "eat" is a primary one; for its original is the Sanskrit root *khád*; but the Hindí root *paiṭh* "enter" is secondary; for there is no Sanskrit root *pravishṭ*, though there is a Sanskrit participle *pravishṭa* "entered" (of the root *pra-viṣ*), from which it is derived.

Among the primary roots there are a few which have suffered no phonetic modification. Thus, the common root *chal* "walk"; W. H. *chalai*, H. H. *chale*, Skr. *chalati*, "he walks." (The E. H., however, has *charai*). But most of them have passed through some sort of phonetic change. These changes are of seven kinds, of which sometimes one, sometimes several have affected the same root. They are—

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* *h* is a euphonic insertion, for the sake of assimilation to *lih-is* "he took", *lih-in* "they took".

1. Simple *phonetic permutation*, consisting in the elision or softening of a consonant, the contraction of adjacent vowels, and the like. *E. g.*, *khá* "eat," Skr. *khád ; chú* "leak," Skr. *chyut ;—toṛ* "break," Skr. *troṭ* (causal of *truṭ) ; paṛ* "fall," Skr. *pat ;—paros* "distribute," Skr. *parivesh ; ho* "be," Skr. *bhú* (*bhava*), &c.

2. *Incorporation of the "class-suffix,"* that is, the suffix, which in Sanskrit is inserted between the root and the personal endings, and according to which Sanskrit roots are divided into ten classes. In Hindí these suffixes are incorporated with the roots. Thus, *bújh* "understand," Skr. *budh + ya (budh* IVth class) *; kop* "be angry," Skr. *kup + ya (kup* IVth) ; *nách* "dance," Skr. *nṛit + ya (nṛit* IVth) ; *sun* "hear," Skr. *ṣṛi + nu (ṣru* Vth) ; *bhanj* "break," Skr. *bhanaj (bhanj* VIIth) ; *ján* "know," Skr. *já + ná (jñá* IXth), &c.

3. *Incorporation of the passive suffix ya.* Thus, *lag* "belong," Skr. *lag + ya ; sích* "irrigate," Skr. *sich-ya ; de* "give," Skr. *dí + ya* (*dá*), &c.

4. *Change of "class."* In Sanskrit all roots are divided into ten classes, partly according to the various suffixes which some take before the personal endings in conjugation, partly according to internal phonetic changes which some undergo. The simplest roots are those of the VIth class; they are not subject to any internal change, but merely add the suffix *a*. In Hindí all roots alike are reduced to the simple form of the VIth class. This is done *(a)* by sometimes substituting the suffix *ă* of the VIth class, for another suffix; or *(b)* by changing the final vowels of other class-suffixes *(u* in the Vth and VIIIth classes, *á* in the IXth class) to *a*. Thus *(a) páva* "obtain" (VIth), Skr. *práp + nu* (Vth; as if it were *práp + a* VIth) ; *máṇga* "ask" (VIth), Skr. *márg + aya* (Xth) ; again *(b) kara* "do" (VIth), Skr. *kar-u* (VIIIth, *kṛi) ; jána* "know" (VIth), Skr. *já + ná* (IXth, *jñá*). That is, the Hindí roots *páv*, *máṇg* (मांग), *kar, ján*, all of the VIth class, correspond to the Sanskrit roots *práp, márg, kṛi, jñá*, of the Vth, Xth, VIIIth and IXth classes respectively, &c.

5. *Change of "voice."* Some Hindí roots are derived from the passive base of a Sanskrit root. Thus, *bhaj* "break" (active), Skr. *bhaj + ya* "be broken" (passive of *bhanj)* ; de "give," Skr. *dí-ya* "be given" (*dá*) ; *sak* "can," Skr. *sak + ya* (*sak*) ; *bik* "sell" (act. intrans.), Skr. *vikri-ya* (*vikrí*), &c.

6. *Change of tense.* Some Hindí roots are derived from the future base of a Sanskrit root. Thus *dekh* "see", Skr. *drakshya* (future of *dṛiṣ*) ; (old H.) *nakh* or *nañkh* "destroy" or "throw away", Skr. *nañkshya* (future of *naṣ*) ; (old H.) *krakh* "draw", Skr. *krakshya* (future of *kṛish*) ; *khech* or *khaich* "draw," Skr. *krakshya* (future of *kṛish*).

7. *Addition of the pleonastic suffix api.* Thus *suháv* "please," Skr. *sukh* (as if it were *sukhápi*). In causal roots this is the universal rule; *e. g.*, *karáv* (or shortened *kará*) "cause to do," as if it were derived from a Sanskrit root *karápi* (instead of *kári*).

It will be observed that the laws 2 and 4, and again 3 and 5 are closely connected.

The preservation of a final single consonant (especially a hard consonant) in a Hindí root is a sure sign of its having been affected by the 3rd or 5th law. The final *g* of such a very common root as *lag* would not have been able to escape elision during its passage through Prákrit, unless it had been protected by another consonant following it; Skr. *lagati* "he belongs" would become Pr. *laaï*, H. *lai*; but Skr. *lagyate* is Pr. *laggaï*, H. *lagai* or *lage.*[*]

The termination *aya* of Sanskrit roots (or rather bases) of the Xth class and of causals is contracted in Prákrit to *e*. This *e* is changed to *a* in Hindí, by the 4th law. Thus Skr. *márgaya* "ask" is Pr. *magge*, H. *mánga* (माँग); Skr. *troṭaya* "break" is Pr. *toḍe*, H. *toṛa*. On the same principle the Skr. *vikríya* "sell" (pass.), which in Pr. becomes *vikke*, is H. *bika;* thus Skr. *vikríyate* "it sells," Pr. *vikkeï*, H. *bikai* or (contracted) *bike.*

Secondary roots may be divided into three sorts, according to the manner of their derivation; whence they may be called derivative, denominative and compound roots.

1. *Derivative roots* are those which are obtained by the ***shortening of a radical vowel.*** *E. g.*, *nah* "flow" from *nahá* "bathe", Skr. *sná*. It will be observed that this process is the exact reverse of the well-known method by which Causals are formed in Sanskrit. These are made by ***lengthening a radical vowel;*** *e. g.*, from the simple root *kar* "do" Sanskrit forms the causal root *kári* "cause to do," for which, by the 7th law, Hindí places *karáv* or *kará*. Now, mistaking *nahá*, which really is a simple root, to be a causal root (as if it meant "cause to flow"), Hindí re-derives from it a simple root *nah;* the pair of roots *nahá* and *nah* being, in outward appearance, exactly like the pair *kará* and *kar*.

2. *Denominative roots* are made by treating nouns, as if they were roots. The nouns which may be treated in this way are either substantives or participles. To the former class belong such roots as *jam* "germinate," derived from the Sanskrit substantive *janma* "birth" (of the Skr. root *jan* "be born"). Of the other kind are *paiṭh* "enter," derived from the

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[*] This process is expressly mentioned by Prákrit Grammarians, in the case of a few roots; as Pr. *rujjhaï* (or *rubbhaï*) act. "he hinders" as well as pass. "he is hindered," from Skr. pass. *rudhyate* "he is hindered," while the Skr. act. is *runaddhi* (VIIth cl.); see H. C. 4, 218, 245, 248. But it clearly occurred in more cases, than they recognized; thus, in all those cases enumerated in H. C. 4, 230. The case of the Hindí root *bhaj* "break" is exactly similar. See also S. Goldschmidt in J. G. O. Soc., Vol. XXIX, p. 492. and Weber *Saptaṣataka*, p. 64.

Sanskrit participle *pravishṭa* "entered" (of the Skr. root *pra-viṣ* "enter"); *baiṭh* "sit" and *píṭh* "beat", derived respectively from the Sanskrit participles *upavishṭa* "sitting" and *pishṭa* "beaten" (of the Skr. roots *upaviṣ* and *pish*).*

3. *Compound roots* consist of the Sanskrit root *kṛi* "do" or "make," and some noun governed by it in the accusative case; in fact, they represent *phrases* in a contracted and much corrupted state. They can easily be recognized by their terminal consonant *k*, which alone remains of their original radical element *kṛi*. Thus *chuk* "cease" is derived from *chyut* + *kṛi*, which is a compound of the Sanskrit noun *chyut* "flowing away" and *kṛi* "make;" *e. g.*, the Skr. 3rd pers. sing. pres. *chyut-kríyate*, lit., "he is made a flowing away," is Pr. *chukkei*, H. *chukai* (or *chuke*) "he ceases." Similarly *ruk* "stop" or "be hindered" comes from *rut* + *kṛi*, *i. e.*, from the Sanskrit noun *rudh* "hindrance" and root *kṛi* "make;" again *kasak* "be pained" or "suffer pain" from *kasham* + *kṛi*, *i. e.*, from the Skr. noun *kasha* "pain" + *kṛi* "make." It is probable, I think, that the Prákrit termination (3rd sing. pres.) *keï*, Hindí *kai* or *ke*, is phonetically derived from the Sanskrit passive *kríyate* "he is made," Skr. *rut karoti* would mean "he makes a hindrance"; this phrase, being treated as a compound word, would form the passive *rutkríyate*,† "he is made a hindrance" or "he is hindered," whence would regularly arise the Prákrit *rukkeï*, and the Hindí *rukkai* or *rukke* "he is hindered." Many of these compound roots are intransitive, which would naturally agree with their derivation from a Sanskrit passive root or base. Others which are transitive could, however, be no less easily derived in the same way, by the aid of the fifth of the above-mentioned laws, the "change of voice."

By far the largest number of Hindí roots can be brought under one or the other of the above-mentioned classes. Still there remains a small number of roots, the derivation of which, as yet, cannot be satisfactorily explained; *e. g.*, *ḍho* "carry," *lauṭ* "return." Even these, further research will probably show to belong to one of the two great classes.

The root *dekh* claims some special consideration on account of the controversy regarding its origin to which it has given rise. Various theories have been put forward,* among which that of Childers is now probably more generally accepted than any other. Stated briefly, his theory, as first applied to the Pali root-form *dakkh*, is that this root is derived from the Sanskrit future base *drakshya* (Skr. *drakshyati* = Páli *dakkhati),* its original future meaning having been forgotten in later times†. The theory, if true, must, of course, equally apply to the root in its Prákrit and Gauḍian form *dekh*. In this form, however, it can hardly be directly connected with the future base. But there is, both in Prákrit and Gauḍian, another very common root *pekh*, also meaning "see". It appears to me most probable that the original form *dakh* was in course of time changed to *dekh*, in order to assimilate it to *pekh*.‡ The formation of such, more or less unintentional, assimilations is quite in keeping with the genius of vernacular languages. There are some very striking instances in Hindí. For example there is in E. Hindí the pair of roots *de* "give", and *le* "take", representing the Sanskrit roots *dá* and *labh*. The 3rd singular present are *dey, ley,* Pr. *deï, leï ;* here *ley* and *leï* "he takes" are formed in assimilation to, or after the analogy of *dey* and *deï* "he gives". Prákrit has also the regular form *lahaï* "he takes", from Skr. *labhate*. Again the E. Hindí has the past participles *dihal* "given", *lihal* "taken"; here *dihal* is formed after the analogy of *lihal*, from Prákrit *lahida*. From the transitive pair of roots *pekh* and *dekh*, another, similarly assimilated, pair *pikh* and *dikh* is derived with, generally,§ an intransitive meaning "be seen", "appear". A more serious objection to Childers' theory, in my mind, was the fact, that the origin assigned to

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* Beames in his Comp. Grammar, Vol. III, p. 37 (footnote) says about me that "he discussed this as if it was his own discovery in Indian Antiquary, Vol. I, p. 357." The word "if" is superfluous. The fact is, my article appeared in the December number of that Journal in 1872, and was written some months previously. Beames' Ist Vol. appeared towards the end of that year, and I did not receive it till after some time in 1873; so that when I wrote the article, it was impossible for me to know, that my views had been anticipated by Beames; though, indeed, it may be questioned, whose the merit of the first discovery is, if such a matter can be dignified by that name. Moreover my theory has a much wider application than Beames', as it includes nouns as well as participles.

† A mongrel form, no doubt, but nothing unusual in colloquial speech.

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* The whole subject of this controversy will be found briefly, but lucidly reviewed in Beames' Comp. Grammar, Vol. III, pp. 45, 46. He does not mention, however, the ingenious theory of the two Goldschmidts (Paul and Siegfried), who explain *dekkh* as a denominative root derived from the past participle *drishṭa*, by assuming the well-known modern pronunciation of ष् *sh* as ख् *kh* to have already existed in Prákrit; (see S. Goldschmidt's Prácṛtica, pp. 6—8, and P. Goldschmidt's Essay in Göttinger Nachrichten, 1874, pp. 518—520). But there is no evidence, really, of the existence of that usage in Prákrit; moreover in the modern vernaculars, ष् would not be pronounced ख्, when it stood first in a conjunct, but only when it stood singly or second in a conjunct: thus one might hear *purukh* (पुरुष) or *barkhá* (बर्षा), but not *jekhṭh* (जेष्ठ, always *jeshṭh*).

† In Kuhn's Beiträge zur vergleichenden Sprachforschung, Vol. VII, p. 450; also in a private letter to myself.

‡ Beames also was of this opinion in his Comp. Gr. Vol. I, p. 162, where he remarks: "it is perhaps worth notice that in scenic Prákrit a very frequent word for 'seeing' is *pekkh*, and that possibly the existence of this verb may have had some influence on the creation of the somewhat anomalous form *dekh*. The idea is based on the well-known fondness of the Indians for jingling words of similar sound." He now appears to have abandoned it, in Vol. III, p. 46. But it cannot be dispensed with; so far at least, as the relation of the later *dekkh* to the earlier *dakkh* is concerned.

§ In the old Hindí of Chand's Prithirája Rasau, *dikh* and *pikh* are commonly used in a transitive sense (see, *e. g.*, the verse on p. 39); also in modern Hindí occasionally.

dekh seemed to be an unique one. So far as I know, no parallel case of such a process of creation of a new root from the future base has hitherto been shown to exist. Quite lately, however, in my reading of Chand's Prithirája Rasau, preparatory to my edition of it in the Bibliotheca Indica,* I have come across two other striking instances of that process, so that I now incline to consider Childers' theory to be fully proved. For this reason, I have now† inserted it in the list of laws of formation of roots, above enumerated. Those two instances are the roots *nakkh* or *nañkh* "destroy" or "throw away" and *krakkh* "draw" or "pull." The former occurs, *e. g.*, in the following verses:

छटकि तसबौ कर नंषै ॥ (or नष्षै) 27, 88.

i. e. "impatiently he throws away his rosary with his hand"; again

हय सार मुष्षं निसंकंत नष्षं ॥ 27, 84.

i. e. "the chiefs of the cavalry he fearlessly destroyed."
The root *krakkh* occurs in the following lines:

बिना लज्ज पष्षै सचौ ढुंढि दिष्षौ ।
मनों डिंभरु आनिकै मीन क्रष्षौ ॥

i. e. "unblushingly searching for a partner, Sachí (wife of Indra) espied him, and, like as the fish her young, so she drew him to herself."

Now the origin of these two curious roots finds a very easy explanation, by applying to them Childers' theory. The future of the root *naṣ* "perish" is in Sanskrit *nañkshyati*, which would be Pr. *nañkhaï* or *nakkhaï*, whence in Hindí *nañkhai* or *nakkhai* with meaning of the present. It is to be noted, that in Hindí the meaning of the root has become transitive (by the 5th law). Similarly the Sanskrit future of the root *kṛish* "draw" is *krakshyati*, Apábhraṃṣa Pr. *krakkhaï*, whence in Hindí, with meaning of present tense, *krakkhai*. It should be observed, that the rhyme in the above lines would require *krikhyau* or a root *krikh*. This may serve to illustrate the process by which assimilations of radical forms are brought about in the vernaculars.

But further there is a another well-known Hindí root, the origin of which, hitherto very puzzling, now finds an easy solution and thus serves as an additional confirmation of Childers' theory. This is the root *khech* or *khaich* or *kheṇch* (खेंच) or *khaiṇch* (खैंच) "draw." The Sanskrit conjunct *ksh* may change in Prákrit to *kkh* or *chchh*; thus the Skr. root *preksh* "see" becomes *pekkh* or *pechchh* in Prákrit; the Sanskrit future base *drakshya*

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* Three fasciculi of this Epic have been published, one of the 1st Vol. by Mr. Beames, and two of the 2nd Vol. by myself; a fourth fasciculus (3rd of Vol. II) as well as an annotated English translation of the 1st fasc. of Vol. II will appear in the course of this year.

† It is not in the list given in my Comparative Grammar, pp. 161—171.

"will see" becomes *dakkha* or *dachchha* in Prákrit (see H. C. 3, 171).* Similarly the Sanskrit future base *krakshya* or *karkshya* would, in Prákrit, become *kakkha* or *kachchha;* and the Sanskrit compound future base *ákarkshya* (of root *á* + *kṛish* "draw") would become *áakkha* or *áachchha.* With the insertion of the usual euphonic *y*, the latter would become *áyachchha.* The Prákrit 3rd singular future accordingly might be *áyachchhaï* or (with the not unusual nasalization instead of the reduplication of a consonant) *áyañchhaï;* and, assuming Childers' theory to be true, this form might occur as a present, equivalent to the Sanskrit *karshati.* Now what I have thus constructed theoretically, is an actual fact, as testified by Hema Chandra in his Grammar (4, 187). He gives the following forms *áyañchhaï, ayañchhaï, áïñchhaï*† as Prákrit equivalents of the Skr. *karshati.* The last form *áïñchhaï* (आइंछइ) has arisen by contracting *ya* into *i*, and is that form which has immediately passed into Hindí, with this difference only, that *chh* has been disaspirated (a process not uncommon in the modern vernaculars). Hindí has *aiṇchai* or *eṇchai* (ऐंचै or एंचै). Now to return to *khech* and its compeers; the uncompounded root *kṛish* would yield a Prákrit form *kachchhai* or *kañchhaï,* which in Hindí, by transferring the lost aspiration of *chh* to *k* and by assimilation to *aiṇchai* and *eṇchai,* would result in the modern forms *khaiṇchai* or *kheṇchai* (खैंचै or खेंचै), or without nasalization, *khaichai* and *khechai.* It will be observed that the later forms *kheṇchai* or *khaiṇchai* are related to what would be the earlier forms *khañchaï* or *kañchhaï,* just as the modern *dekhai* and Prákrit *dekhhaï* are to the Páli *dakkhati.*

There are two other roots which also deserve a special word. One is the root *hokh* "be" or "become." It is an equivalent of the commoner root *ho* by the side of which it is very commonly used in Eastern Hindí. In Western Hindí, I believe, it is unknown. It is regularly conjugated, through all tenses. Its origin is obscure. I am inclined to look upon it as formed by the same (practically pleonastic) suffix *sk* which also occurs in such roots as *achchh* "be", *gachchh* "go", yachchh "hold", the element *sk* would change in Prákrit either to *kkh* or to *chchh;* so that *bhúsk* (or *bhavask*) would become Pr. *hokkh*, H. *hokh*, just as *ásk* (of *ás*) becomes Pr. *achchh*, H. *achh*, or *gask* (of *gam*) becomes Pr. *gachchh.* Possibly—though I do not think it, probable—the origin of *dekh* might be accounted for in a similar way.

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* See also footnote on page 49. The Prákrit word *sarichchha* "similar" exhibits the root-form *dichcha*, which is to *dekkh* (or *dikkh*), as *pechchh* is to *pekkh.* On the other hand its Sanskrit equivalent *sadṛiksha* exhibits the Prákrit root *dekh* or *dichh* in its Sanskrit dress *dṛiksh*, and is, I believe, the only instance of the admission of that mongrel Prákrit root into Sanskrit.

† The MS. readings vary. H. C. also gives the forms *anachchhaï* and *ñachhaï;* in the former the nasal has been transferred to fill up the hiatus, in the latter *ái* is contracted into *a.*

The other is the still more common root *áv* (or H. H. *á*) "come." Its origin has, I think, not yet been satisfactorily explained. One would naturally connect it with the Skr. root *á-yá*, from which, clearly the Maráṭhi root *ye* "come" is derived. But this does not explain the terminal consonant *v* in the Hindí *áv*. Now it is a curious fact, that the root *áv* imitates, in every respect, the conjugational forms of the root *páv* (Skr. *práp* = *pra-áp*), instead of those of the root *já* "go" (Skr. *yá*) which one would expect it to follow. Thus, present participle E. H. *ávat* or W. H. *ávatu* "coming," E. H. *pávat* or W. H. *pávatu*[*] "obtaining," but E. H. *ját* or W. H. *játu* "going;" past participle E. H. *áïl* or *áyal* or *ává*, W. H. *áyau* "come," E. H. *páïl* or *páyal* or *pává*, W. H. *páyau* "obtained," but E. H. *gáïl* or *gayal* or *gayá*, W. H. *gayau* "gone;" 3rd sing. present H. *ávai*, H. H. *áve* "he comes," H. *pávai*, H. H. *páve* "he obtains," but H. *jáy*, H. H. *jáe* "he goes." I incline, therefore, to think that there is here another instance of the, already noticed, tendency of the Indian Vernaculars to assimilate verbal forms, so that the *v* in *áv* is due to the influence of *páv;* an influence, natural enough, when it is remembered that *v*, equally with *y*, is often inserted between two adjacent vowels for the sake of euphony.[†] This assimilation is a very old one. There are traces of it in Prákrit as well as in the Gipsy dialects. In Prákrit there is the 3rd sing. pres. *áveï*,[‡] and shortened *ávaï* (H. C. 4, 367) "he comes." The regular Prákrit form would be *ááaï* or shortened *áaï* (see H. C. 4, 240); but just as there is *uṭṭheï* or shortened *uṭṭhaï* (H. C. 4, 17) for *uṭṭháaï* or *uṭṭhái* (see Vr. 8, 25) "he stands up" (of root *ut-sthá*), so there might be *áeï* or *áaï* (of root *á-yá*), from which, by the insertion of the connecting consonant *v*, there would arise *áveï* and *ávaï*.[§]

The following List of Hindí Roots is arranged alphabetically, in two parts. Part I contains primary roots, while Part II consists of secondary roots.

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[*] *Páyatu* in Kellogg's Hindi Grammar, p. 202, § 377, is a misprint.

[†] This influence of *páv* even intrudes occasionally into the conjugation of *já* "go"; thus the E. H. has sometimes *jává* "gone," like *ává*, *pává;* and the 3rd sing. pres. *jáve* is rather common in H. H. beside *jáe* or *jáye*.

[‡] This form is quoted by Dr. R. Mitra from the Pingala in the Vocabulary appended to his edition of the Sankshipta-sára. I have not been able to verify it; but the form is not intrinsically improbable.

[§] It is just possible to connect *áv* with the Skr. root *api-i;* thus 3rd sing. *apyeti* Pr. *appeï* or *ápeï* or *áveï* (cf. *kádum* "to do" for *kattum*). H. C. 4, 400 seems to refer it to Skr. *á-pad* (or better *á-pat ?*). The Bangálí uses an altogether different root, *áïs* or *ás*. Beames, in his Comparative Grammar (III, pp. 44, 45) rightly refers this root, as well as the Sindhí *ach*, to the Skr. root *á-gachh* (of *á-gam*). Disaspiration of an aspirate and pronunciation of *chh* as *s* are not uncommon in the Indian vernaculars (see my Comparative Grammar, §§ 11, 145, exc. 2). The root *ágachh* would become in Pr. *áachh* (see Delius, *Radices Pracriticae*, pp. 69, 70) or *áyachh;* by contraction in Bangálí, the former would become *ás* (for *áchh*), the latter *áïs* (for *áichh*). The root *áïs* might, however, be also referred to the Sanskrit root *á-viṣ*.

PART I.—*Primary Roots.**

1 अट् *roam* = Skr. अट्, Passive अट्यते (with active sense), Pr. अट्टइ (H. C. 4, 230), H. अटै.

2 अनुहर् *resemble* = Skr. अनु + हृ, I. cl. अनुहरति, Pr. अणुहरइ (H. C. 4, 259 = Skr. सदृशीभवति), E. H. अनुहरै.

3 आव् *come*, see introductory remarks, p. 41.

4 आहर् *feed* = Skr. आ-हृ, I. cl. आहरति, Pr. आहरइ (H. C. 4, 259 = Skr. खादति), E. H. आहरै.

5 उखाड़् *pluck up* = Skr. उत् कृष्, I. cl. उत्कर्षति, Pr. उक्कड्ढइ (H. C. 4, 187), H. उखाडै (with transfer of aspiration, as in खैचै, see p. 40 and my Comp. Gramm. § 132); see No. 28.

6 उघाड़् *reveal* = Skr. उद्-घट्, X. cl. उद्घाटयति, Pr. उग्घाडेइ or VI. cl. उग्घाडइ (H. C. 4, 33), H. उघाड़ै.

7 उठ् *rise* = Skr. उत्-स्था, Passive उत्थीयते (with active sense), Pr. उट्ठेइ (cf. E. M. p. 27 and Ls. p. 345, also उत्थेइ) or VI. cl उट्ठइ (H. C. 4, 17), H. उठै. In Pr. also VI. cl. उट्ठाअइ or contr. उट्ठाइ (Vr. 8, 26), in H. *deest*.

8 उड़् *fly* = Skr. उद्-डी, IV. cl. उड्डीयते, Pr. उड्डेइ (Cw. p. 99, Spt. v. 223) or VI. cl. उड्डइ, H. उड़ै.

9 उतर् *descend* = Skr. उत्-तॄ, I. cl. उत्तरति, Pr. उत्तरइ (H. C. 4, 339), H. उतरै.

10 उथल् intr. *upset, come off from, come down* = Skr. उत्-स्खल्, I. cl. उत्-स्खलति (उच्छलति), Pr. उत्थल्लइ (H. C. 4, 174), H. उथलै.

11 उथार् or उथाल् tr. *upset, take down* = Skr. उत्-स्खल्, Causal उत्-स्खालयति, Pr. उत्थालेइ or VI. cl. उत्थालइ, H. उत्थालै or उथारै.

12 उपज् *grow up* = Skr. उत्-पद्, IV. cl. उत्पद्यते, Pr. उप्पज्जइ (cf. H. C. 3, 142), H. उपजै.

13 उबल् *boil* = Skr. उद्-ज्वल्, I. cl. उज्ज्वलति, Pr. उब्बलइ, H. उबलै; cf. root बल् .

14 उबार् *keep in reserve* = Skr. उद्-वृ, Causal उद्वारयति, Pr. उब्बारेइ or VI. cl. उब्बारइ, H. उबारै.

15 उभार् *raise up, excite* = Skr. उद्-भृ, Causal उद्भारयति, Pr. उब्भारेइ or VI. cl उब्भारइ, H. उभारै.

16 उरह् or उलह् *grow up*, also *reprove* = Skr. उद्-लभ्, I. cl. उल्लभते, Pr. उल्लहइ (T. V. 3, 1. 133 = निस्सरति, H. C. 4, 259 has उल्लुहइ), E. H. उरहै, W. H. उलहै. In the sense "reprove" perhaps connected with उलथ्?

17 उहर् *subside* = Skr. अव-तॄ, I. cl. अवतरति, Pr. ओहरइ (H. C. 4, 85 ओअरइ, v. l. अहरइ (with euphonic ह्), H. उहरै.

18 ऊँघ् *be drowsy* = Skr. ? , Pr. उंघइ (H. C. 4, 12 = निद्रायति), H. ऊँघै.

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* See List of Abbreviations at the end of this article.

19 ऊभ् *be excited, raised up* = Skr. उद्-भू, I. cl. उद्भवति, Pr. उब्भवइ (Vr. 8, 3) or उब्भइ (cf. भंति for भवंति H. C. 4, 365), H. ऊभै; or denom. from ऊर्ध्व. Pr. उब्भ, cf. H. C. 2, 59.

20 ओढ़् see secondary roots.

21 औट् *burn* = Skr. अव-कुट्, IV. cl. अवकुट्यति, Pr. ओउट्टइ, H. औटै.

22 औस् *rot* = Skr. अप-वस्, I. cl. अपवसति, Pr. अववसइ or ओवसइ, H. औसै (for ओउसै).

23 कर् *do* = Skr. कृ, VIII. cl. करोति, vedic also I. cl. करति, Pr. करइ (Vr. 8, 13), H. करै. In Pr. also X. cl. करेइ (H. C. 4, 337); Vedic also V. cl. कृणोति, Pr. कुणइ (Vr. 8, 13), *deest* in H.

24 कस् *test* = Skr. कष्, I. cl. कषति, Pr. कसइ, H. कसै.

25 कस् *tighten* = Skr. कृष्, I. cl. कर्षति, but also VI. cl. कृषति, whence Pr. कसइ, H. कसै.

26 कह् *say* = Skr. कथ्, X. cl. कथयति, Pr. कहेइ (Spt. v. 35) or VI. cl. कहइ (H. C. 4, 2. Cw. p. 99), H. कहै.

27 काट् *cut* = Skr. कृत्, Causal कर्तयति, Pr. कट्टेइ or VI. cl. कट्टइ, (cf. 1. sg. कट्टउं H. C. 4, 385), H. काटै.

28 काढ़् *draw* see secondary roots.

29 काँप् or कप् *tremble* = Skr. कंप्, I. cl. कम्पति, Pr. कंपइ (H. C. 1, 30), H. काँपै or कपै.

30 किन् or कीन् *buy* = Skr. क्री, IX. cl. क्रीणाति, Pr. किणइ (Vr. 8, 30) or किणइ (Dl. p. 22), H. किनै or कीनै.

31 कूट् *pound* = Skr. कुट्, X. cl. कुट्टयति, Pr. कुट्टेइ or VI. cl. कुट्टइ, H. कूटै.

32 कूँद् or कूद् *jump* = Skr. स्कुंद् (or स्कद्), I. cl. स्कुंदते, Pr. कुंदइ, H. कूँदै or कूदै.

33 कोड़् or कोर् *scrape, dig* = Skr. कुट्, X. cl. कोटयते, Pr. कोडेइ or कोडइ, W. H. कोड़ै or E. H. कोरै.

34 कोप् *be angry* = Skr. कुप्, IV. cl. कुप्यति, Pr. कुप्पइ (H. C. 4, 230), H. कोपै.

35 खप् *be expended, sold* = Skr. क्षप् (X. cl. or Causal of क्षि), Passive क्षप्यते, Pr. खप्पइ, H. खपै.

36 खा *eat* = Skr खाद्, I. cl. खादति, Pr. खाअइ or (contracted) खाइ (H. C. 4, 228), H. खाय्.*

37 खाँस् *cough* = Skr. कास्, I. cl. कासते, Pr. कासइ or खासइ, (cf. H. C. 1, 181, खासिअं = कासितं), H. खाँसै.

38 खिल् *be delighted, flower* = Skr. क्रीड्, Pass. क्रीड्यते, Pr. खिड्डइ or खिल्लइ (cf. H. C. 4, 168 खेड्ड and 4, 382 खेल्ल), H. खिलै.

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* In Prákrit also the Passive खाद्यते is used, apparently in an active sense; e. g. खज्जंति "they eat" (Dl. p. 54, quoted from the Mṛchchhakaṭika; R. M. p. 87, seemingly quoting the same, gives खज्जदि).

39 खीज or खीझ *be vexed* = Skr. खिद्, VI. cl. खिन्दति; but also VII. cl. खिन्ते or IV. cl. खिद्यते, Pr. खिज्जइ (H. C. 4, 224), H. खीजै or (corrupted) खीझै.

40 खुल् *be opened* or *open* = Skr. खुड्, Passive खुड्यते, Pr. खुड्डइ or खुलइ, H खुलै. See Nos. 41, 44.*

41 खूट् *pluck* = Skr. चोट, Passive चोट्यते (actively), Pr. खुड्डइ (H. C. 4, 116, said to be a substitute for Skr. तोडते of root तुड्), H. खूटै.

42 खेल *play* = Skr. क्रीड् (cp. कील् and खेल्), I. cl. क्रीडति, Pr. खेड्डइ (H. C. 4, 188) or खेलइ (H. C. 4, 382), H. खेलै. (Pr. also कीलइ Dl. p. 47).

43 खो *throw away, lose* = Skr. क्षिप्, VI. cl. क्षिपति, Pr. खिवइ, H. खोय् (with खो for इव, see my Comp. Grammar, § 122).

44 खोल् *open* = Skr. खुड् *divide*, X cl. खोडयति, Pr. खोडेइ or VI. cl. खोडइ or खोलइ, H. खोलै. See Nos 40, 41.

45 गठ *tie* = Skr. ग्रंथ्, IX. cl. ग्रथ्नाति, also I. cl. ग्रन्थति, Pr. गंठइ (H. C. 4, 120), H. गठै.

46 गढ़ or गड़् *form, grave* = Skr. घट्, I. cl. घटते, Pr. गढइ (H. C. 4, 112), H. गढ़ै or गड़ै. See Nos 54, 59.

47 गढ़ाव् *form* = Skr. घट्, Caus. घाटयति, Pr. गढावेइ or गढावइ (H. C. 4, 340), H. गढ़ावै.

48 गन् or गिन् *count* = Skr. गण्, X. cl. गणयति, Pr. गणेइ (S. B. 11, 27) or VI. cl. गणइ (H. C. 4, 358), H. गनै or (corr.) गिनै (see my Comp. Grammar § 35, note).

49 गम् *be spent* = Skr. गम्, Pass. गम्यते, Pr. गम्मइ (Vr. 7, 9. 8, 58) H. गमै.

50 गरियाव् or गलियाव् *to abuse* = Skr. गर्ह् or गल्ह्, X. cl. गर्हयति, Pr. गरिहावइ (cf. H. C. 2, 104) or गलिहावइ, E. H. गरियावै for गरिहावै.

51 गल् *melt* = Skr. गल्, I. cl. गलति, Pr. गलइ (H. C. 4, 418), H. गलै.

52 गह् *seize* = Skr. ग्रह्, IX. cl. गृह्णाति, Pr. VI. cl गेण्हइ (Vr. 8, 15) or गंण्हइ (T. V. 2, 4. 157), H. गहै.

53 गा *sing* = Skr. गै, I. cl. गायति, Pr. गायइ or (contr.) गाइ (Vr. 8, 26), H. गाय्.

54 गाढ़् or गाड़् or E. H. गार्ह् *form*; see secondary roots.

55 गिर् *fall* = Skr. गॄ, VI. cl. गिरति, Pr. गिरइ, H. गिरै.

56 गुह् *thread* = Sk. गुफ्, VI. cl. गुफति. Pr. गुहइ (H. C. 1, 236), H. गुहै.

57 गोंच् *catch* = Skr. ग्लुंच् (or ग्लुच्), I. cl. ग्लुंचति, Pr. गुंचइ, H. गोंचै.

58 घट् *decline* = Skr. घट्ट् *depress*, Passive घट्ट्यते, Pr. घट्टइ, H. घटै.

59 घड़् *form, happen* = Skr. घट्, I. cl. घटते, Pr. घडइ (H. C. 4, 112) H. घड़ै. See Nos. 46, 54.

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* The roots खुल्, खोल्, खूट् are all connected with one another and with the Sanskrit roots चोट्. खोट, खोड, खोर्, खोल्, खुण्ड्, खुड्, खुर्, छुर्, which all mean 1, "limp," 2, "divide" or "break." The original form, apparently, is चोट् or छुर्, or rather छुट्.

60 घस् or घिस् *rub, be worn away* = Skr. घृष्, I. cl. घर्षति, Pr. VI. cl. घसइ (= घृषति) or घिसइ (H. C. 4, 204, where it is said to be a substitute of ग्रसति), H. घसै or घिसै.

61 घाल् *throw, destroy, mix* = Skr. घट्, I cl. घट्टते, Pr. घड्डइ or घल्लइ (H. C. 4, 334. T. V. 3, 4. 6 where it is said to be a substitute of क्षिपति), H. घालै.

62 घुल् or घोल् *mix with a liquid, dissolve* = Skr. घूर्ण् (also घुण् and घोल्), I. and VI. cl. घूर्णति (also घोणते, घुणति, घोलयति), Pr. घुलइ or घोलइ (Vr. 8, 6. H. C. 4, 117), H. घुलै or घोलै (see also Bs. III, p. 56).

63 घूम *revolve* = Skr. घूर्ण्, VI. cl. घूर्णति, Pr. घुम्मइ (H. C. 4, 117), H. घूमै (also Bs. I, 344).

64 घेर् *gather, surround* = Skr. ग्रह? ; compare H. घर *house* with Skr. गृह.

65 चढ् *mount, increase* = Skr. उत्-शद्, VI. cl. उच्छदति, Pr. (dropping उ) चड्ढइ or चड्डइ (T. V. 3, 1. 128), H. चढ़ै.*

66 चप् *be abashed* = Skr. चप् *press*, Passive चप्यते, Pr. चप्पइ (see H. C. 4, 395. चंपिज्जइ, T. V. 3, 4, 65. चप्पिज्जइ), H. चपै. The transitive form is चाप् or चाँप्.

67 चर् *graze* = Skr. चर्, I. cl. चरति, Pr. चरइ, H. चरै.

68 चल् or चाल् *walk* = Skr. चल्, I. cl. चलति, Pr. चलइ or चल्लइ (H. C. 4, 231), H. चलै or चालै.

69 चव् *drip* = Skr. च्यु, I. cl. च्यवते, Pr. चवइ (H. C. 4, 233), H. चवै. See No. 74.

70 चाव् *masticate* = Skr. चर्व्, I. cl. चर्वति, Pr. चव्वइ, H. चावै (see also Bs. III, 40.)

71 चिंत् *think* = Skr. चिंत्, X. cl. चिन्तयति, Pr. चिंतेइ (Spt. 156, H. C. 4, 265) or चिंतइ (H. C. 4, 422), H. चिंतै.

72 चिन् *gather* = Skr. चि, V. cl. चिनोति, Pr. VI. cl. चिणइ (Vr. 8, 29. H. C. 4, 241), H. चिनै.

73 चुन् *gather, choose* = Skr. चि, V. cl. चिनोति, Pr. VI. cl. चुणइ (H. C. 4, 238), H. चुन.

74 चू *leak* = Skr. च्युत् (or श्च्युत्), I. cl. च्योतति, Pr. चोअइ or चुअइ (H. C. 2, 77), H. चूए

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* उत् + शद् lit. *fall upwards*, an unusual word in Skr., but formed exactly like the common compound उत् + पत्.—The final द् of शद् becomes ड् in Pr., see H. C. 4, 130 झडइ and Vr. 8, 51. H. C. 4, 219 सडइ. The initial उ is dropped, and the aspiration of छ् transferred to ड् or lost altogether, just as in the root चाह्, *desire*, from उच्छाह = उत्-साह or from इच्छा (see my Comp. Grammar § 132). In old H. the root is चड्; M. has both चढ् and चड्; but G., S. and B. have चड्, which is the form given by H. C. 4, 206 (चडइ). T. V. 3, 128 gives both चड्डइ and चडइ.

75 चूम् *kiss* = Skr. चुंब्, I. cl. चुम्बति, Pr. चुंबइ (Vr. 8, 71), H. चूमै.

76 छा *thatch* = Skr. छद्, X. cl. छादयति, Pr. छाएइ (cf. Dl. 54) or VI. cl. छाअइ (T. V. 2, 4. 110 or छायइ in H. C. 4, 21) or छाइ (by contraction; cf. Vr. 8, 26), H. छाय्.

77 छिप् or चिप् or छुप् *be hidden* = Skr. क्षि *dwell secretly*, Causal Passive क्षेप्यते, Pr. छेप्पइ or छिप्पइ, H. छिपै or (corr.) चिपै or छुपै.

78 छी or छीव् *touch* = Skr. स्पृश्, VI. cl. स्पृशति, Pr. छिहइ or छिवइ (H. C. 4, 182), H. छीहै or छीवै. See No. 80.*

79 छीज् *waste away* = Skr. छिद्, Passive छिद्यते, Pr. छिज्जइ (H. C. 4, 434), H. छीजै.

80 छू or छुव् *touch* = Skr. छुप्, VI. cl. छुपति, Pr. छुवइ, H. छूऐ or छूवै. See No. 78.

81 छूट् or छुट् *be released* = Skr. छुट् *cut*, Pass. छुट्यते, Pr. छुट्टइ, H. छूटै or छुटै.

82 छोड् *release* = Skr. छुट् Causal छुटयति, Pr. छोडेइ or VI. cl. छोडइ, H. छोड़ै (see also Bs. III, 52).

83 जन् *give birth* = Skr. जन्, Causal जनयति, Pr. जणेइ (Spt. 75) or VI. cl. जणइ, H. जनै. Skr. also IV. cl. जायते, Pr. जाअइ (H. C. 4, 136), H. *deest.*

84 जप् *recite* = Skr जल्प्, I. cl. जल्पति, Pr. जंपइ (Vr. 8, 24), H. जपइ.

85 जर् *be feverish* = Skr. ज्वर्, I. cl. ज्वरति, Pr. जरइ, H. जरै.

86 जल् *burn* = Skr. ज्वल्, I. cl. ज्वलति, Pr. जलइ (H. C. 4, 365), H. जलै.

87 जा *go* = Skr. या, II. cl. याति, Pr. VI. cl. जाअइ or (contr.) जाइ (H. C. 4, 240), H. जाय्.

88 जाग् or जागर् *watch* = Skr. जागृ, II. cl. जागर्ति, Pr. I. cl. जागरइ and VI. cl. जग्गइ (H. C. 4, 80), H. जागरै or जागै.

89 जान् *know* = Skr. ज्ञा, IX. cl. जानाति, Pr. VI. cl. जाणइ (H. C. 4, 7), H. जानै, (also Bs. III, 41).

90 जी *live* = Skr. जीव्, I. cl. जीवति, Pr. जीअइ (H. C. 1, 101), H. जीऐ.

91 जुझ् *fight* = Skr. युध्, IV. cl. युध्यते, Pr. जुज्झइ (Vr. 8, 48), जुझै (also Bs. I, 328). In old H. also झुझ्.

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* H. C. 4, 182 identifies the roots छिह् and छिव् with Skr. स्पृश्, for which he gives the Pr. Pass. छिप्पइ (H. C. 4, 257). The latter is merely a hardened form of छिव्वइ, which would be the regular Pass. of छिवइ or rather of छिहइ. Now Skr. स्पृश् = Pr. छिह् or, on account of labial प्, = छुव् (see No. 80); again in Pr., ह्य = भ्य = व्य = व्व. Hence Skr. स्पृश्यते = Pr. *छिह्यइ = *छिव्यइ = छिप्पइ. It follows that the radical forms छिव् and छुव् (H. छी and छू) are *derivative* roots, made from the Passives छिव्व and छुव्व, and that the Skr. root छुप् is merely the Pr. root छुव in a Skr. dress (cf. Pr. पडुप्पइ &c., and see S. Goldschmidt in J. G. O. S. 29, 493).

92 जुट् *be joined* = Skr. जुट्, Passive जुट्यते, Pr. जुट्टइ, H. जुटै; a very old secondary denominative root of युक्त p. p. of Skr. root युज्.

93 जोड़् *join* = Skr. जुट्, X. cl. जोटयति, Pr. जोडेइ or VI. cl. जोडइ, H. जोड़ै.

94 झट् *argue, dispute* = Skr. झट्, I. cl. झटति, Pr. झटइ, H. झटै. See No. 96.

95 झड़् or झर् *fall off* = Skr. शद्, VI. cl. (शदति), Pr. झडइ (H. C. 4, 130 for सडइ), H. झड़ै or झरै. See No. 97.

96 झाँट् *rush about* = Skr. झट्, Passive झट्यते (used in active sense), Pr. झंटइ (H. C. 4, 161. for झट्टइ), H. झाँटै.*

97 झाँड् *sweep off* = Skr. शद्, Causal शादयति, Pr. झाडेइ or VI. cl. झाडइ, H. झाड़ै. See No. 95.

98 झाल् *polish* = Skr. ज्वल् *shine* (?), Causal ज्वालयति, Pr. *झालेइ or VI. cl. *झालइ, H. झालै; cf. Skr. झला *brilliancy*, झलका *flame*.

99 टक् or टंक् *stitch* = Skr. टंक्, I. cl. टङ्कति, Pr. टंकइ, H. टंकै or टकै. Probably a compound root of कृ.

100 टूट् or तूट् *break* = Skr. त्रुट्, VI. cl. त्रुटति, but also IV. cl. त्रुट्यति, Pr. तुट्टइ (H. C. 4, 230) or टुट्टइ (Pingal, as quoted by R. M. p. 99), H. तूटै or टूट.

101 ठग् *cheat* = Skr. स्थग्, I. cl. स्थगति, Pr. ठगइ, H. ठगै.

102 डार् or डाल् *throw away* = Skr. दॄ *be scattered*, Causal दारयति, Pr. *डारेइ or VI. cl. *डारइ, H. डारै or डालै (cf. H. C. I, 217 डरो).

103 डाँस् or डास् or डस् *bite* = Skr. दंश् or दस्, I. cl. दंशति or दसति, Pr. डसइ (H. C. 1, 218) or डंसइ, H. डाँसै or डासै or डसै.

104 डोल् *swing* = Skr. दुल्, X. cl. दोलयति, Pr. दोलेइ (H. C. 4, 48) or डोलेइ (see H C. 1, 217 डोला) or VI. cl. डोलइ, H. डोलै.

105 ढक् *cover* = Skr. स्थग्, Pass. स्थग्यते (used actively), Pr. ढक्केइ, (Spt. A. 54 for ठग्गेइ) or VI. cl. ढक्कइ (H. C. 4, 21, where it

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* In B. this root is confounded with झाँड् "sweep." It is closely connected with the root झट, the original meaning of which is preserved in Maráṭhí "rush violently into contact with," and in the Hindí झट् "quickly." Hence it comes to mean, on the one hand, "dispute, argue"; on the other hand, "become intermixed confusedly", "be entangled." With the latter meaning the root झट् has been received into Sanskrit; from it comes the Skr. झाट "shrub," "underwood," the H. झाट or झाड. The original meaning it has preserved in the Skr. झटिति "quickly." The root may possibly be derived (as Bs. I, 177 says) from Skr. अधि+अट्, though the sense of "roam about very much" would be expressed rather by अति + अट. But अध्यटति or Pass. अध्यट्यते (in act. sense) would regularly give Pr. अज्झटइ or अज्झट्टइ or (by elision of अ) झटइ or झट्टइ, whence modern झटै or झाँटै. In the case of the root अट्, ट् does not change to ड. (see H. C. 1, 195).

is said to be a substitute of छाद्), H. ढकै. (See Wb. p. 43, 64, 67). Perhaps compound root of स्थग्-कृ.

106 ढांस् *accuse* = Skr. ? Pr. ढंसइ (H. C. 4, 118 where it is said to be a substitute for Skr. विवृत्), H. ढांसै. Perhaps a modification of डांस्, No. 103.

107 ढूक् *approach* = Skr. ढौक्, I. cl. ढौकते, Pr. ढुक्कइ, H. ढुकै.

108 ढूंढ् *search* = Skr. ढुंढ्, VI. cl. ढुण्ढति, Pr. ढुंढइ, H. ढूंढै.

109 तप् *burn* = Skr. तप्, I. cl. तपति, but also IV. cl. तप्यति, Pr. तप्पइ (see H. C. 4, 140 संतप्पइ), H. तपै.

110 तर् *cross* = Skr. तृ, I. cl. तरति, Pr. तरइ (H. C. 4, 86), H. तरै.

111 ताक् *attend* = Skr. तर्क्, X. cl. तर्कयति, Pr. तक्केइ (H. C. 4, 370) or VI. cl. तक्कइ, H. ताकै

112 तान् *stretch* = Skr. तन्, Causal तानयति, Pr. ताणेइ or VI. cl. ताणइ, H. तानै.

113 तार् *save* = Skr. तॄ *cross*, Causal तारयति, Pr. तारेइ or VI. cl. तारइ, H. तारै.

114 तुल् intrans. *weigh, be weighed* = Skr. तुल्, Passive तुल्यते, Pr. तुल्लइ, H. तुलै.

115 तोड़् or तोर् *break* = Skr. त्रुट् *be torn*, Causal त्रोटयति, Pr. तोडेइ or VI. cl. तोडइ (see H. C. 4, 116, where however it is given as intrans.), W. H. तोड़ै or E. H. तोरै.

116 तौल् or तोल् *weigh* = Skr. तुल्, X. cl. तोलयति or I. cl. तोलति, Pr. तोलेइ or तोलइ (T. V. 2, 4. 97), H. तोलै or तौलै.*

117 थम् or थम्ह् *be arrested, be supported* = Skr. स्तंभ्, I. cl. स्तम्भते, Pr. थम्भइ, H. थम्भै or थम्है See my Comp. Grammar § 120.

118 थाम् or थाम्ह् or थाम्भ् or थंभ् *stop* = Skr. स्थंभ् *be firm*, Causal स्थाम्भयति, Pr. थंभेइ or VI. cl. थंभइ, H. थांभै, &c.

119 थोप् *pile, prop* = Skr. स्तूप्, IV. cl. स्तूप्यति, Pr. थुप्पइ, H. थोपै.

120 दब् *be pressed down, be cowed* = Skr. दम्, Passive दम्यते, Pr. दम्मइ or *दब्बइ, H. दबै (?)

121 दल् *split* = Skr. दल्, I. cl. दलति, Pr. दलइ (H. C. 4, 176), H. दलै.

122 दह् intrans. *burn* = Skr. दह्, I. cl. दहति, Pr. दहइ (Pingala, as quoted by R. M. p. 113; H. C. 2, 218 allows only डहइ; but the root डह् does not occur in H), H. दहै.

123 दार् *split* = Skr. दॄ, Causal दारयति, Pr. दारेइ or VI. cl. दारइ, H. दारै.

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* H. C. 4, 25 gives Pr. तुलइ; but the root तुल् in a trans. sense does not occur in H., though it is found in M. तुल् or तुळ्. In Skr. the root तुल् admits a X. cl. form तुलयति, from which the Pr. and M. trans. root तुल् is apparently derived.

124 दाह् trans. *burn* = Skr. दह्, Causal दाहयति, Pr. दाहेइ or VI. cl. दाहइ, H. दाहै, see No. 122.

125 दिस् *show* = Skr. दिश्, VI. cl. दिशति, Pr. दिसइ, H. दिसै.

126 दिस् or दीस् *to appear* = Skr. दृश् *see*, Passive दृश्यते, Pr. दिस्सइ or दीसइ (H. C. 3, 161), H. दिसै or दीसै.

127 दे *give* = Skr. दा, Passive दीयते (used actively), Pr. देइ (Cw. p. 99, H. C. 4, 238), H. देय् or दे. In Pr. also VI. cl. दइ (Spt. v. 216), H. *deest.*

128 देख् *see* = Skr. दृश्, Future द्रक्ष्यति (used in sense of present), Pr. देक्खइ (H. C. 4, 181), H. देखै. See introductory remarks.*

129 धर् *place* or *seize* = Skr. धृ, I. cl. धरति *(seize)* or धरते *(place)*, Pr. धरइ (H. C. 4, 234), H. धरै.

130 धंस् or धस *sink, be pierced, run into* = Skr. ध्वंस्, I. cl. ध्वंसते, Pr. धंसइ or धसइ (Pingala in R. M. p. 118, said to be a substitute for धावति), H. धंसै or धसै.

131 धार् *hold* = Skr. धृ, Causal धारयति, Pr. धरेइ or VI. cl. धरइ, H. धरै.

132 धो *wash* = Skr. धाव्, I. cl. धावति (or धू, VI. cl. धुवति), Pr. धोअइ (Dl. p. 77) or (with euphonic व) धोवइ, or धुंअइ (Spt. v. 133, 283) or धुवइ (H. C. 4, 238), H. धोए or धोवै.

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* The Skr. conjunct क्ष्य may in Pr. become क्ख or च्छ. This will explain the origin of the synonyms of देक्खइ, which are enumerated in H. C. 4, 181; viz., with क्ख are formed अवअक्खइ = Skr. अवद्रक्ष्यति (from root अव-दृश्); the same, contracted, becomes ओअक्खइ (with ओ for अव, see H. C. 1, 172); and the latter, expanded, becomes अवक्खइ (with अव् for ओ, see my Comp. Gramm. § 48). With च्छ are formed अवयच्छइ = Skr. अवद्रक्ष्यति (for अवअच्छइ, with euphonic य्, see H. C. I, 180), and निअच्छइ = Skr. निद्रक्ष्यति (from नि-दृश्). Again च्छ appears to be softened in अवयज्झइ, which is probably identical with अवयच्छइ. From the manner in which Hemachandra places पेच्छइ between निअच्छइ and अवयच्छइ. it would almost seem as if he looked upon it as a contraction of पअच्छइ = Skr. प्रद्रक्ष्यति (of प्र-दृश्). In classical Sanskrit the future of दृश् takes the irregular guṇa र (instead of अर्, see Panini VI, 1, 58); but in the ordinary speech, no doubt, both forms द्रक्ष्यति and दर्क्ष्यति were used. It is the latter of the two, from which the Prákrit forms are derived; thus अवअक्खइ=अवद्क्खइ (not = अवदक्खइ)=अवदर्क्ष्यति. The alternative form of निअच्छइ would be निअक्खइ; this seems to be intended by the form णिअक्कइ in Vr. 8, 69 (with क्क disaspirated for क्ख). The Pr. पासइ is regularly formed from Skr. पश्यति = Pr. पस्सइ (see Delius *Rad. Prac.*) or पासइ (H. C. 1, 43); and Pr. अवआसइ is the Skr. अवपश्यति. In Maráṭhí, the Pr. root पास् becomes पाह्. The Pr. पुलोएइ is derived from Skr. प्रविलोकयति (with अवि contracted to उ, see my Comp. Gramm. § 122); and Pr. पुलएइ is probably a mere corruption of it. None of all these forms, as far as I am aware, has left any representative in modern Hindí.

133 **नट्** *dance*, see secondary roots.

134 **नव्** or **नौ** intr. *bend, bow* = Skr. **नम्**, I. cl. **नमति**, Pr. **नमइ** (see H. C. 1, 183, **नमिम** 1. pl.) or **नवइ** (H. C. 4, 226), H. **नवै** or **नौऐ**.

135 **नवाव्** or **निवाव्** trans. *bend, fold* = Skr. **नम्**, Causal **नमयति**, Pr. **नवावेइ** or VI. cl. **नवावइ**, H. **नवावै** or **निवावै** (with **इ** for **अ**, see my Comp. Gramm. § 55).

136 **नहा** *bathe* = Skr **स्ना**, II. cl. **स्नाति**, Pr. IV. cl. **ण्हाअइ** (cf. Dl. 20) or (contr.) **ण्हाइ** (H. C. 4, 14), H. **नहाय**.

137 **नाच्** *dance* = Skr. **नृत्**, IV. cl. **नृत्यति**, Pr. **नचइ** (Vr. 8, 47. H. C. 4, 225), H. **नाचै**.

138 **निकाल्** or **निकार्** *pull out*, see secondary roots.

139 **निकास्** *expel* = Skr. **निस्-कस्**, Causal **निष्कासयति**, Pr. **निक्कासेइ** or VI. cl. **निक्कासइ**, H. **निकासै**; cf. No. 138, the Skr. root **कस्** being perhaps adopted from Pr. **कस्** for Skr. **कृष्**.

140 **निखोड़्** or **निखोर्** *peel;* see secondary roots.

141 **निखर्** *be cleaned, be peeled* = Skr. **नि-क्षर्**, I. cl. **निक्षरति**, Pr. **निक्खरइ**, H. **निखरै**.

142 **निखार्** *clean, peel* = Skr. **नि-क्षर्** (or **नि-क्षल्**), Causal **निक्षारयति**, Pr. **निक्खारेइ** or VI. cl. **निक्खारइ**, H. **निखारै**.

143 **निगल्** *swallow;* see secondary roots.

144 **निथार्** *to make clear* = Skr. **नि-स्थल्**, Causal **निस्थलयति**, Pr. **नित्थालेइ** or VI. cl. **नित्थालइ**, H. **निथारै**, applied to water, which is made clear by letting it stand still, till the impurities have settled down, and then pouring it off; hence the root has also the meaning "pour off."

145 **निबड़्** *be separated, be decided, be accomplished* = Skr. **निर्-वट्** *divide*, (X. cl. **निर्वटयति**), Pr. **निव्वडेइ** or **निव्वडइ** (H. C. 4, 62, where it is said to mean **पृथक् स्पष्टो वा भवति**), H. **निबड़ै**. It is the pass. or intrans. form of No. 147. The Skr. root is transitive.

146 **निबाह्** or **निभा** *accomplish* = Skr. **निस्-वह्**, Causal **निर्वाहयति**, Pr. **निव्वाहेइ** or VI. cl. **निव्वाहइ**, H. **निबाहै** or **निभाय्** (with transferred aspiration; see my Comp. Gramm. § 132).

147 **निबाड़्** *separate, divide, accomplish* = Skr. **निर्-वट्** *divide*, Causal **निर्वाटयति**, Pr. **निव्वाडेइ** or VI. cl. **निव्वाडइ**, H. **निबाड़ै**. See No. 145.

148 **निबेड़्** *separate, divide, accomplish* = Skr. **निर्-वंड**, I. cl. **निर्वंडते**, Pr. **निव्वंडइ**, H. **निबेड़ै** (with **ए** for **अ**, see my Comp. Gramm. § 148). This is merely another form of No. 147.

149 **निवार्** *hinder* = Skr. **नि-वृ**, Causal **निवारयति**, Pr. **निवारेइ** (H. C. 4, 22) or VI. cl. **निवारइ**, H. **निवारै**.

150 **निसर्** *come out* = Skr. **निस्-सृ**, I. cl. **निस्सरति**, Pr. **निस्सरइ** (see R. M. p. 107; or **नीसरइ** H. C. 1, 93. 4, 79), H. **निसर**.

151 **नोच्** *pinch* = Skr. **नि-कुंच्** *contract*, VI. cl. **निकुचति**, Pr. **निउंचइ** H. **नोचै** (with **ओ** for **इउ**).

152 पच् *be digested* = Skr. पच् *digest*, Passive पच्यते, Pr. पचइ, H. पचै.

153 पठाव् *send* = Skr. प्र-स्था, Causal प्रस्थापयति, Pr. पट्ठावेइ or VI. cl. पट्ठावइ (H. C. 4, 37), H. पठावै.

154 पड़् or पर् *fall* = Skr. पत्, I. cl. पतति, Pr. पडइ (Vr. 8, 51), W. H. पड़ै, E. H. परै.

155 पढ़् *read* = Skr. पठ्, I. cl. पठति, Pr. पढइ (H. C. 1, 199), H. पढ़ै.

156 परख् or परक् *examine, test* = Skr. परि-ईक्ष्, I. cl. परीक्षते, Pr. परिक्खइ, H. परखै. It also has the secondary meaning "become habituated", owing to repeated trial.

157 परच् *become acquainted* = Skr. परि-चि, Pr. VI. cl. *परिचइ, H. परचै.

158 पला or परा *run away* = Skr. पलाय्, I. cl. पलायते, Pr. पलायइ or (contr.) पलाइ (Pingala, quoted by R. M. p. 129),* H. पलाय् or पराय्.

159 परिहर् *forsake* = Skr. परि-हृ, I. cl. परिहरति, Pr. परिहरइ (H. C. 4, 259 said to be = त्यजति), H. परिहरै.

160 परोस् *offer food* = Skr. परि-विष्, Causal परिवेषयति, Pr. परिवेसेइ or VI. cl. परिवेसइ, H परोसै (with ओ = इवे, see my Comp. Gramm. § 122).

161 पसर् *be spread* = Skr. प्र-सृ, I. cl. प्रसरति, Pr. पसरइ (H. C. 4, 77), H. पसरै.

162 पसार् *spread* = Skr. प्र-सृ, Causal प्रसारयति, Pr. पसारेइ or VI. cl. पसारइ, H. पसारै.

163 पसीज् *perspire* = Skr. प्र-स्विद्, IV. cl. प्रस्विद्यति, Pr. पसिज्जइ (see H. C. 4, 224), H. पसीजै.

164 पसूज *stitch* = Skr. प्र-सिव्, IV. cl. प्रसीव्यति, Pr. *पसुज्जइ (perhaps contracted for *पसिविज्जइ), H. पसूजै.

165 पहिनाव् or पिहनाव् *cause to put on, cause to dress* = Skr. पि-नह्, Causal पिनाहयति, Pr. पिनहावेइ or VI. cl. पिनहावइ, H. पिहनावै (with transposition of न् and ह्) or पहिनावै (with transposition of इ and अ, see my Comp. Gramm. § 133). See also Nos. 166, 167 for a similar transposition. From this root is formed the derivative root पिहन् or पहिन् *put on, dress.*

166 पहिर् *put on, dress* = Skr. परि-धा, Passive परिधीयते (with active sense), Pr. परिधेइ (see Cw. p. 99, sútra 21 धेइ) or परिधइ (see Wb. p. 59 देइ and दइ of root दा) or परिहइ, H. पहिरै (with transposition of र् and ह्, see No. 165). This root, however, might be also a derivative root from पहिराव् No. 167. In the Gujaráti form पेहर् the इ of the second syllable has modified the vowel of the first.

167 पहिराव् *cause to put on, cause to dress* = Skr. परि-धा, Causal परिधाप-

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* पलाउ, I suppose, is a misprint for पलाइ.

यति, Pr. परिधावेइ or VI. cl. परिधावइ or परिहावइ, H. पहिरावै (with transposition of र and ह, as in Nos. 165, 166).

168 पहुँच् or पहुच् or पहुक्, *obtain, arrive* = Skr. प्र-भू, I. cl. प्रभवति, Pr. *पहुच्छइ or पहुचइ (H. C. 4, 390), H. पहुकै or पहुचै or पहुँचै. It is formed with the pleonastic suffix क्ख, like the root देख्, see introductory remarks; only in this case, क्ख changes to च्छ and is afterwards disaspirated. Maráṭhí has पोहंच् or पोहोंच्, where the उ of the second syllable has modified the first.

169 पाड् *let fall* = Skr. पत्, Causal पातयति, Pr. पाडेइ (H. C. 4, 22) or VI. cl. पाडइ (H. C. III, 153), H. पाड़ै.

170 पार् *accomplish* = Skr. पृ, Causal पारयति, Pr. पारेइ or VI. cl. पारइ (H. C. 4, 86), H. पारै.

171 पाल् *cherish* = Skr. पा, Causal पालयति, Pr. पालेइ or VI. cl. पालइ, H. पालै.

172 पाव् *obtain, find* = Skr. प्र-आप्, V. cl. प्राप्नोति, Pr. VI. cl. पावइ (H. C. 4, 239), H. पावै.

173 पिघल् *melt* = Skr. अपि- or पि-गल्, I. cl. अपिगलति, Pr. पिगलइ H. पिघलै? See my Comp. Gramm. § 131.

174 पी *drink* = Skr. पा, I. cl. पिबति, Pr. पिअइ (H. C. 4, 10), H. पीयै.

175 पीच् *tread down* = Skr. पिष्, Future पेक्ष्यति (with meaning of present), Pr. पेच्छइ or पिच्छइ, H. पीचै (with disaspiration, as in खेचै, see introductory remarks, p. 40).

176 पीड् *be pained* = Skr. पीड्, I. cl. पीडते, Pr. पीडइ, H. पीड़ै.

177 पीस् *grind* = Skr. पिष्, VII. cl. पिनष्टि. Pr. X. cl. पिंसेइ or पीसेइ (cf. Ls. p. 347) or VI. cl. पिंसइ or पीसइ (H. C. 4, 185), H. पीसै.

178 पुराव् *fill, thread* = Skr. पॄ, Causal पूरयति, Pr. पुरावेइ or VI. cl. पुरावइ, H. पुरावै (or W. H. also पिरावै in the sense of *threading, stringing*).

179 पूछ् *ask* = Skr. प्रछ्, VI. cl. पृच्छति, Pr. पुच्छइ (H. C. 4, 97), H. पूछै.

180 पूंछ or पोंछ् *wipe* = Skr. प्र-उंछ्, I or VI. cl. प्रोञ्छति, Pr. पोंछइ or पुंछइ (H. C. 4, 105), H. पोंछै or पूंछै.

181 पूज् *worship* = Skr. पूज्, X. cl., but also I. cl. पूजति, Pr. पूजइ, H. पूजै.

182 पइर् or पैर् *swim* = Skr. प्र + तॄ, I. cl. प्रतरति or VI. cl. प्रतिरति, Pr. पइरइ, E. H. पइरै or W. H. पैरै.

183 पइस् or पैस् *enter* = Skr. प्र-विश्, VI. cl. प्रविशति, Pr. पविसइ (H. C. 4, 183) or पइसइ H. पइसै or पैसै.

184 पेल् *squeeze out, shove* = Skr. पीड्, I. cl. पीडते, Pr. पेलइ (H. C. 4, 143), H. पेलै. See No. 42, खेलै from root क्रीड्. Perhaps a denominative of पिष्ट = पेट्ठ = पेल्ल = पेल.

185 पोस् *nourish* = Skr. पुष्, I. cl. पोषति, Pr. पोसइ, H. पोसै.

186 फट् or फाट् *burst* = Skr. स्फट्, Passive स्फट्यते, Pr. फट्टइ, H. फाटै or फटै.

187 फल् *bear fruit* = Skr. फल्, I. cl. फलति, Pr. फलइ (Spt. 17), H. फलै. Connected with roots स्फट् and पट्; see No. 189.

188 फंस् or फांस् *stick, be ensnared* = Skr. स्पृश्, VI. cl. स्पृशति, Pr. फंसइ or फासइ (H. C. 4, 182, probably denom. of फंस or फास = स्पर्श cf. Vr. 4, 15. H. C. 2, 92), H. फंसै or फांसै. This root is also used transitively, in the sense of "ensnare", "deceive", see H. C. 4, 129, where फंसइ is said to be a substitute of विसंवदति.

189 फाड् *cleave, split* = Skr. स्फट्, X. cl. स्फाटयति, Pr. फाडेइ or VI. cl. फाडइ. (H. C. 1, 198. 232), H. फाड़ै. Hemachandra refers it to root पट्, X cl. पाटयति.

190 फाँद् *jump* = Skr. स्पंद् *shake*, Causal स्पंदयति, Pr. फंदेइ or VI. cl. फंदइ, H. फाँदै. Observe the same transition of meaning as in No. 191. It is also used transitively, in the sense of "ensnare", "imprison", corresponding to the intransitive root फंद्, see secondary roots. H. C. 4, 127 gives फंदइ in its original sense of "shaking", "quivering" = Skr. स्पंदते; its synonym चुलुचुलइ, which H. C. also gives, still exists in H. चुलचुलै or चुरबुरै or चुलमुलै or चुलचुलावै, &c., "he is fidgety."

191 फाल् *jump* = Skr. स्फल् *shake*, Causal स्फालयति, Pr. फालेइ or VI. cl. फालइ, H. फालै. Probably connected with root No. 189; H. C. 4, 198. 232 give फालेइ as an other form फाडेइ.

192 फिट् *be paid off, be discharged* = Skr. स्फिट्, X. cl. स्फिटयति, Pr. फिट्टइ (H. C. 4, 177, said to be = भ्रंश् "cease", "decline"), H. फिटै; cf. R. स्फट् and स्फुट्.

193 फुट् or फूट् *expand, increase, be broken, be dispersed* = Skr. स्फुट्, Passive स्फुट्यते, Pr. फुट्टइ (Vr. 8, 53. H. C. 4, 177, where it is said to be a substitute of भ्रंश, in the sense of "being broken"), H. फुटै or फूटै. See No. 194.

194 फुल् or फूल् *blossom* = Skr. स्फुट्, VI. cl. स्फुटति, Pr. फुट्टइ or फुडइ (Vr. 8, 53) or फुल्लइ (H. C. 4, 387 whence Skr. R. फुल् adopted), H. फुलै or फूलै. See No. 193.

195 फेर् or फिर् *turn, move round* = Skr. परि + इ, II. cl. पर्येति, Pr. फेरेइ or फेरइ (with change of प to फ and of र्य् to एर, as in पेरंतो for पर्यंतः), H. फेरै.

196 फैल् *spread, be dispersed* = Skr. स्फिट, X. cl. स्फेटयति, Pr. फेडेइ or VI. cl. फेडइ (H. C. 4, 358; in H. C. 4, 177 the simple form फिडइ is given as a substitute of भ्रंश्) or फेलइ (whence Skr. R. फेल्), H. फैलै See Nos. 189, 192, 193; the original meaning "split", hence "expand", may change either to "increase" or to "decrease", to growth or to decay.

197 फो *unfasten* = Skr. प्र-मुच्, VI. cl. प्रमुञ्चति, Pr. पमुच्चइ (cf. H. C. 4, 91), H. फोरै (for पोरै = पउरै).

198 फोड़् *break* = Skr. स्फुट्, Causal स्फोटयति, Pr. फोडेइ (H. C. 4, 350) or VI. cl. फोडइ, H. फोड़ै.

199 बच् *go away, escape* = Skr. व्रज्, I. cl. व्रजति, Pr. वचइ (Vr. 8, 47), H. बचै. More likely from root वच्, or from Pass. वृत्यते of Skr. R. वृत्.

200 बज् or बाज् *sound* = Skr. वद्, Causal Passive वाद्यते, Pr. वज्जइ (H. C. 4, 406), H. बजै or बाजै.

201 बझ् *be ensnared* = Skr. बंध्, Passive बध्यते, Pr. बज्झइ (H. C. 2, 26. 4, 247), H. बझै.

202 बट् tr. and intr. *twist, divide* = Skr. वट्, Passive वट्यते, Pr. वट्टइ, H. बटै.

203 बढ़् or E. H. बाढ़् *grow* = Skr. वृध्, I. cl. वर्द्धते, Pr. वड्ढइ (Vr. 8, 44), H. बढ़ै or E. H. बाढ़ै.

204 बढाव् *enlarge, complete* = Skr. वृध्., Causal वर्धयति, Pr. वड्ढावेइ or VI. cl. वड्ढावइ, H. बढावै. (T. V. 3, 1. 132 has वड्ढाविअं = समापितं).

205 बताव् *show, relate* = Skr. वृत्, Causal वर्त्तयति, Pr. वत्तावेइ or VI. cl. वत्तावइ, H. बतावै.

206 बध् *kill* = Skr. बध् (or बाध्, I. cl. बाधते), Pr. बधइ, H. बधै.

207 बन् *be made* = Skr. वन्, Passive वन्यते, Pr. वण्णइ, H. बनै. In Sindhí it means "*go, come,*" cf. the Mágadhí वञ्ञदि (H. C. 4, 294) which the Prákrit Grammarians derive from the Skr. R. व्रज् *go* or *become.*

208 बर् *marry* = Skr. वृ, V. cl. वृणोति, but also I. cl. वरति, Pr. वरइ (Vr. 8, 12), H. बरै.

209 बरिस् or बरस् *rain* = Skr. वृष्, I. cl. वर्षति, Pr. वरिसइ (Vr. 8, 11.; perhaps denom. of वर्ष), E. H. बरिसै or W. H. बरसै.

210 बल् *burn* = Skr. ज्वल्, I. cl. ज्वलति, Pr. बलइ (H. C. 4, 416 बलंति), H. बलै.

211 बस् *dwell* = Skr. वस्, I. cl. वसति, Pr. वसइ, H. बसै.

212 बह् *flow* = Skr. वह्, I. cl. वहति, Pr. वहइ (H. C. 1, 38), H. बहै. The root बहल् *glide happily, be diverted* is a passive or intrans. of a causal बहलाव् formed like पिलाव् from पीय् *drink.*

213 बाँच् *recite, read;* see secondary roots.

214 बाँछ् *wish* = Skr. वांछ्, I. cl. वाञ्छति, Pr. वांछइ (T. V. 3, 1. 133), H. बाँछ.

215 बाँध् *bind* = Skr. बंध्, IX. cl. बध्नाति, Pr. VI. cl. बंधइ (H. C. 1, 187), H. बाँधै.

216 बाल् or बार् *kindle, light* = Skr. ज्वल्, Causal ज्वालयति, Pr. वालेइ or वालइ, W. H. बालै or E. H. बारै. See No. 210.

217 बास् *perfume* = Skr. वास्, X. cl. वासयति, Pr. वासेइ or VI. cl. वासइ, H. बासै.

218 बिक् *be sold* = Skr. वि-क्री *sell*, Passive विक्रीयते, Pr. विक्केइ or विक्कइ, H. बिकै (see Vr. 8, 31. H. C. 4, 240, where however the form विक्केइ is given as act. trans ; in the moderns it is intrans. or pass., and the trans. root is बेच्, cf. No 242.

219 बिगड़् or E. H. बिगर् *be at variance, be spoiled* = Skr. वि-घट्, I. cl. विघटते, Pr. विगडइ (cf. H. C. 4, 112), H. बिगड़ै (for बिगडै). See No. 46.

220 बिगाड् *make discord, spoil* = Skr. वि-घट्, Causal विघाटयति, Pr. विगाडेइ or VI. cl. विगाडइ, H. बिगाड़ै (for बिगाडै). See No. 54.

221 बिचार् *reflect* = Skr. वि-चर्, Causal विचारयति, Pr. विचारेइ or VI. cl विचारइ, H. बिचारै.

222 बिडर् *scatter* = Skr. वि-दॄ, IX. cl. विदृणाति, Pr. I. cl. विडरइ (cf. No. 102), H. बिडरै.

223 बिडार् *drive away* = Skr. वि-दॄ, Causal विदारयति, Pr. विडारेइ or VI. cl. विडारइ, H बिडारै. See No. 102.

224 बितर् *grant* = Skr. वि-तॄ, I. cl. वितरति, Pr. वितरइ, H. बितरै.

225 बिथार् tr. *spread* = Skr. वि-स्तॄ, Causal विस्तारयति, Pr. वित्थारेइ or VI. cl. वित्थारइ, H. बिथारै.

226 बिराव् *mock ;* see secondary roots.

227 बिलख् or बिलक् *see, be confused* = Skr. वि-लक्ष्, X. cl. विलक्षयति, Pr. विलक्खेइ or VI. cl. विलक्खइ, H बिलखै or (corrupt) बिलकै.

228 बिलग् intr. *separate* = Skr. वि-लग्, Passive विलग्यते (with active sense), Pr. विलग्गइ (cf. Vr. 8, 52), H. बिलगै.

229 बिलंग् *ascend* = Skr. वि-लंघ्, I. cl. विलङ्घति, Pr. विलंघइ, H. बिलंगै (for बिलंघै).

230 बिलस् *be pleased* = Skr. वि-लस्, I. cl. विलसति, Pr. विलसइ, H. बिलसै.

231 बिलाव् tr. and intr. *disperse, vanish* = Skr. वि-ली, Causal विलापयति, Pr. विलावेइ or VI. cl. विलावइ, H. बिलावै.

232 बिहर् *enjoy one's-self* = Skr. वि-हृ, I. cl. विहरति, Pr. विहरइ (H. C. 4, 259 where it is said to be a substitute of Skr. क्रीडति), H. बिहरै.

233 बिहाय् or बिहा *leave, spend* = Skr. वि-हा, III. cl. विजहाति, Pr. I. cl. विहाअइ or विहायइ or (contr.) विहाइ, H. बिहायै or बिहाय्; cf. Vr. 8, 26.

234 बिसर् *forget* = Skr. विस्मृ, I. cl. विस्मरति, Pr. विसरइ (cf. H. C. 4, 74), H. बिसरै.

235 बीझ् *tear, break up* = Skr. भिद्, Passive भिद्यते (used actively), Pr. भिज्जइ, H. बीझै (for भीजै, with aspiration transferred ; see my Comp. Gramm. § 132), or perhaps Skr. व्यध्, IV. cl. विध्यति, Pr. विज्झइ, H. बीझै.

236 बीत् *pass ;* see secondary roots.

237 बीन् or बिन् *choose* = Skr. व्री, IX. cl. व्रीणाति or व्रिणाति, Pr. VI. cl. वीणइ or विणइ, H. बीनै or बिनै.

238 बुझ् *be extinguished* = Skr. वि-अव-क्षै, I. cl. व्यवक्षायति, Pr. वोज्झोइ or वोज्झाइ (or बु॰), H. बुझै. See Weber Spt. p. 32.*

239 बुड् or बूड् *dive, sink* = Skr. ब्रुड्, VI. cl. ब्रुडति Pr. बुड्डइ (H. C. 4, 101), H. बुडै or बूडै or W. H. transposed डुबै or डूबै.

240 बुत् *be extinguished* = Skr. वि-आ-इत् *come to an end*, I. cl. व्यान्तते, Pr. वअत्तइ or वोत्तइ or बुत्तइ, H. बुतै. Compare H. बत्ती = वर्त्तिका *light*, lit. *wick*.

241 बुहार् *gather, sweep* = Skr. वि-अव-हृ, Causal व्यवहारयति, Pr. वोहारेइ or VI. cl. वोहारइ, H. बुहारै.

242 बूझ् *understand* = Skr. बुध्, IV. cl. बुध्यते, Pr. बुज्झइ (Vr. 8, 48), H. बूझै

243 बेच् *sell* = Skr. व्यच् *cheat*, VI. cl. विचति, Pass. व्यच्यते (used actively), Pr. वेच्चइ (H. C. 4, 419, T. V. 3, 3. 4, transl. प्रयच्छति ?), E. H. बेच्; or perhaps Skr. वि-अति + इ *spend*, II. cl. व्यत्येति, Pr. वेच्चेइ or वेच्चइ ?

244 बेढ् *surround ;* see secondary roots.

245 बैस् or बइस् *sit* = Skr. उप-विश्, VI. cl. उपविशति, Pr. उवविसइ H. बइसै or बैसै (with loss of initial उ, see my Comp. Gramm. § 173).

246 बो *sow* = Skr. वप्, I. cl. वपति, Pr. वोवइ or वोअइ (formed like सोवइ of स्वप्, H. C. 1, 64), H. बोए.

247 बोड् *immerse* = Skr. ब्रुड्, Causal ब्रोडयति, Pr. बोडेइ or VI. cl. बोडइ, H. बोडै.

248 बोलाव् or बुलाव् or बलाव् *call* = Skr. वद्, Causal वादयति, Pr. बोल्लावेइ or VI. cl. बोल्लावइ, H. बोलावै, &c. See No. 249.

249 बोध् *wheedle* = Skr. बुध्, Causal बोधयति, Pr. बोधेइ or VI. cl. बोधइ, H. बोधै.

250 बोल् *speak* = Skr. वद्, I. cl. वदति. Pr. वोल्लइ (H. C. 4, 2.) or वोलइ (Cw. 99), H. बोलै. (cf. No. 245 वप् = वोव्, so वद् = वोल्).†

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[*] The simple root क्षै would form Pr. झायइ and contracted झाइ, after the analogy of ठायइ, ठाइ from स्था, झायइ or झाइ from ध्यै (Vr. 8, 26); this is born out by Páli झायति, and by Pr. विज्झाइ (H. C. 2, 28 = Skr. वि-क्षायति); but in compounds the Pr. form might be ॰झोइ or ॰झाइ, just like ॰ठेइ or ॰ठइ in उट्ठेइ, उट्ठइ form उत्+स्था (H. C. 4, 17); thus we should have regularly वोज्झोइ or (as *o* is short before a conjunct) बुज्झोइ, बुज्झाइ.

[†] This root is usually connected with Skr. वद् by Prákrit Grammarians, see Cw. p. 99, where वोव्वइ or वोच्चइ, of root वच्, is mentioned as an analogous formation. Now the latter is derived from the passive *वुच्यते (उच्यते), in an active sense, as appears from H. C. 4, 161. Similarly, I am inclined to derive वोल्लइ from the passive *वूर्यते (for ब्रूयते of root ब्रू), used actively. The conjunct र्य becomes ल्ल, as in पल्लाणं = पर्याणं, सोअमल्लं = सौकुमार्यं (Vr. 3, 21).

251 भख् *eat, devour* = Skr. भक्ष्, I. cl. भक्षति, Pr. भक्खइ, H. भखै.

252 भज् *worship* = Skr. भज्, I. cl. भजति, Pr. भजइ, H. भजै.

253 भज् or भाज *flee* = Skr. भंज् *break*, Passive भज्यते (used actively), Pr. भज्जइ, H. भजै or भाजै.

254 भंज् *break* = Skr. भंज्, VII. cl. भनक्ति, Pr. VI. cl. भंजइ (H. C. 4, 106), H. भंजै.

255 भन् *speak* = Skr. भण्, I. cl. भणति, Pr. भणइ (H. C. 4, 239), H. भनै.

256 भर् *fill* = Skr. भृ, III. cl. बिभर्त्ति and I. cl. भरति, Pr. भरइ (cf. Spt. 288 भरंति), H. भर.

257 भव् or भौं *revolve* = Skr. भ्रम्, I. cl. भ्रमति, Pr. भमइ (H. C. 4, 161) or भवइ (cf. H. C. 4, 401), H. भवै or भौरै. See No. 134 नव् or नौ.

258 भंस् *float* = Skr. भ्रंश्, I. cl. भ्रंशते, Pr. भंसइ, H. भंसै.

259 भाल् *see* = Skr. भल्, X. cl. भालयते, Pr. भालेइ or VI. cl. भालइ, H. भालै.

260 भास् *appear* = Skr. भास्, I. cl. भासते, Pr. भासइ (H. C. 4, 203), H. भासै. Pr. has also the form भिसइ which is preserved in the Hindí root भिसल् *dazzle*.

261 भीज् *be afflicted* = Skr. भिद् *break*, Passive भिद्यते, Pr. भिज्जइ, H. भीजै. See No. 234. Or from अभि-अर्द् *afflict*, Pass. अभ्यर्द्यते, Pr. अभिज्जइ, H. भीजै (with loss of अ, see my Comp. Gramm. § 172).

262 भीज *be wet*; see secondary roots.

263 भुंज् *eat* = Skr. भुज्, VII. cl. भुनक्ति, Pr. VI. cl. भुंजइ (H. C. 4, 110), H. भुंजै.

264 भून् *fry*; see secondary roots.

265 भेड़् *close*, for बेढ् with transposed aspiration, see No. 244.

266 भेट् *meet, visit* = Skr. अभि-अट्, I. cl. अभ्यटति, Pr. इब्भट्टइ, H. भेटै (with loss of initial अ; and with ए for इ; see my Comp. Gramm. §§ 148, 172).

267 मच् *be raised up, be made, be stirred up, be excited* = Skr. मंच् or मच्, Passive मच्यते, Pr. मच्चइ (H. C. 4, 230 where it is referred to the Skr. root मद्), H. मचै. From it are derived many Hindí nouns, all meaning lit. "an erection", माचा or मचा or मचान or मचाला *a large bedstead* or *stage*, मचिया *a small bed, stool*, मच् *drowsiness;* also many secondary roots, as मचमच् *creak in the joints* (as a bedstead, &c.), मचक् *creak or pain in the joints*, मचकाव् *wink*, मचल् or मचलाव् *be fidgety, be perverse, feel nausea.*

268 मंज् *clean* = Skr. मृज्, II. cl. मार्ष्टि and I. cl. मृञ्जति, Pr. मंजइ (whence Skr. R. मंज् X. cl.), H. मंजै.

269 मढ़् *cover* = Skr. मृद्; see secondary roots.

270 मन् *be propitiated* = Skr. मन्, Causal Passive मान्यते, Pr. मन्नइ, H. मने. See No. 277.

271 मर् *die* = Skr. मृ, VI. cl. म्रियते, but Vedic also I. cl. मरति, Pr. मरइ (Vr. 8, 12), H. मरै.

272 मल् *rub* = Skr. मृद्, IX. cl. मृद्गाति Pr. VI. cl. मलइ (Vr. 8, 50), H. मलै.

273 मह् *churn* = Skr. मथ्, I. cl, मथति. Pr. महइ (cf. Dl. 53), H. महै.

274 माँग् *ask for* = Skr. मार्ग्, X. cl. मार्गयति and I. cl. मार्गति, Pr. मग्गइ (Spt. 71), H. मग्गै. Cp. Skr. R. मृग्, IV. cl. मृग्यति, which would give the Pr. मग्गइ equally well; but the denom. R. मार्ग् is the more probable source, as Pr. and Gauḍ. have a preference for denominative verbs.

275 माँज् *scour* = Skr. मार्ज्, X. cl. मार्जयति (or R. मृज्, X. cl. मार्जयति, see remarks on No. 274), Pr. मंजेइ or VI. cl. मंजइ, H. माँजै.

276 माँड् or माड् *rub* = Skr. मृद्, IX. cl. मृद्गाति or I. cl. मर्दति, Pr. मड्डइ (H. C. 4, 126), H. माडै or माँडै.

277 मान् *honor, heed* = Skr. मन्, Causal मानयति, Pr. मानेइ or VI. cl. मानइ, H. मानै, See No. 270.

278 माप् or नाप् *measure* = R. मा, Causal Passive माप्यते (used actively), Pr. माप्पइ, H. मापै. The form नाप is either a mere corruption of माप्, or it may be similarly derived from the Causal Passive ज्ञाप्यते (of root ज्ञा), Pr. नप्पइ, H. नापै.

279 मार् *beat, kill* = Skr. मृ, Causal मारयति, Pr. मारेइ (H. C. 4, 337) or VI. cl. मारइ (H. C. 3, 153), H. मारै.

280 मिल् *meet* = Skr. मिल्, VI. cl. मिलति, Pr. मिलइ (H. C. 4, 332), H. मिलै.

281 मिस् *be pulverised* = Skr. मृश्, VI. cl. मृशति, Pr. मिसइ, H. मिसै.

282 मीछ् or मीच् *wink* = Skr. मिष्, future मेक्ष्यति (used in sense of present), Pr. मेच्छइ or मिच्छइ, H. मीछै or (corrupt) मीचै. See introductory remarks pp. 37—40, and No. 175.

283 मीँज् or मीज् *rub* = Skr. मृज्, II. cl. मार्ष्टि or I. cl. मृञ्जति, Pr. मिंजइ, H. मीँजै or मीजै.

284 मूँड् *shave* = Skr. मुंड्, I. cl. मुण्डति, Pr. मुंडइ (H. C. 4, 115), H. मूँडै.

285 मूस् *steal* = Skr. मूष्, I. cl. मूषति, Pr. मूसइ (T. V. 2, 4. 69), H. मूसै.

286 मोह् *allure* = Skr. मुह्, Causal मोहयति, Pr. मोहेइ or VI. cl. मोहइ, H. मोहै.

287 रख् *keep, place* = Skr. रक्ष्, I. cl. रक्षति, Pr. रक्खइ (H. C. 4, 439), H. रखै.

288 रच् intr. *be made* or tr. *make* = Skr. रच् *make*, Passive रच्यते (used actively), Pr. रच्चइ (cf. H. C. 4, 422, 23 रच्चसि. Spt. 363 रचिय =रचित), H. रचै.

289 रम् *roam, enjoy* = Skr. रम्, I. cl. रमते, Pr. रमइ (H. C. 4, 168), H. रमै.

290 रह् *stop, remain* = Skr. रक्ष्, Passive रक्ष्यते Pr. रक्खइ, H. रहै (for रखै)*

291 राज् *be adorned* = Skr. रंज or रञ्, IV. cl. रज्यति, Pr. रज्जइ, H. राजै

292 राँध् or रौँध् *cook* = Skr. रध्, Causal रन्धयति, Pr. रंधेइ or VI. cl. रंधइ, H. राँधै or (corr.) रौँधै.

293 रिस् *be vexed* = Skr. रिष्, IV. cl. (or Pass.) रिष्यते, Pr. रिस्सइ, H. रिसै.

294 रुच *be agreeable* = Skr. रुच्, Passive रुच्यते, Pr. रुच्चइ (H. C. 4, 341), H. रुचै.

295 रुप् intr. *be fixed, stop* = Skr. रुह्, Causal Passive रोप्यते, Pr. रोप्पइ or रुप्पइ, H. रुपै.

296 रुस् or रूस् *be angry* = Skr. रुष्, IV. cl. रुष्यति, Pr. रुस्सइ or रूसइ (Vr. 8, 46), H. रुसै or रूसै; cf. No. 302.

297 रुंद् or रूँद् or रोंद् or रौंद् *trample on*, probably a corrupt spelling of the following, No. 298.

298 रुंध् or रूँध् or रोंध् or रौंध् *enclose, restrain* = Skr. रुध्, VII. cl. रुणद्धि, Pr. रुंधइ (Vr. 8, 49), H. रुंधै or रूँधे or रोंधै or रौंधै.

299 रेंग् *creep* = Skr. रिंग्, I. cl. रिंगति, Pr. रिंगइ or रिग्गइ (H. C. 4, 259), H. रेंगै.

300 रो *weep* = Skr. रुद्. II. cl. रोदिति, Vedic also VI. cl. रुदति. Pr. रुवइ (H. C. 4, 226. 238) or रुव्वइ (Spt. 311) or I. cl. रोवइ (H. C. 4, 226. 238) or रोव्वइ (K. I. 4, 69), H. रोवै or रोए.

301 रोल् *roll, plan* = Skr. लुल्, I. cl. लोलति, Pr. लोलइ, H. रोलै.† See Nos. 313, 314.

302 रोस् *be angry* = Skr. रुष्, Vedic I. cl. रोषति, Pr. रोसइ, H. रोसै; cf. No. 296.

303 लख् *see* = Skr. लक्ष्, I. cl. लक्षते, Pr. लक्खइ, H. लखै.

304 लग् *be applied* = Skr. लग्, Passive लग्यते, Pr. लग्गइ (Vr. 8, 52), H. लगै.

305 लंघ् or लाँघ् *jump over* = Skr. लंघ्, I. cl. लंघति, Pr. लंघइ, H. लंघै or लाँघै.

306 लड़् or E. H. लर् *dispute, fight* = Skr. लड, X. cl. लडयति, Pr. लडेइ

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* The derivation is somewhat obscure; but it can hardly be referred (as Bs. III, 40) to the Skr. root रह् which has a very different meaning "desert". The derivation from रक्ष is supported by the Maráṭhí form राह् = र.ख्. On the change of ख् to ह, see my Comp. Gramm. § 116.

† There is a large number of Skr. roots, all closely connected in meaning; *viz.* रुट्, रुड्, रोड्, रौड्; लुट, लुड्, लुल, लोड्, &c.

or VI. cl. लडइ, W. H. लड़े or E. H. लरै.

307 लस् or लास् *shine, be fit* = Skr. लस्, I. cl. लसति or X. cl. लासयति, Pr. लसइ or लासइ, H. लसै or लासै.

308 लह् *find, avail, get on well* = Skr. लभ्, I. cl. लभते, Pr. लहइ (H. C. 4, 335), H. लहै.

309 लाज् *feel ashamed* = Skr. लज्ज्, I. cl. लज्जति, Pr. लज्जइ (H. C. 4, 103), H. लाजै

310 लिख् *write* = Skr. लिख्, VI. cl. लिखति, Pr. लिखइ, H. लिखै The ordinary Pr. root लिह् (H C. 1, 187 लिहइ) does not exist in Hindí.

311 लिप् *be smeared* = Skr. लिप्, Passive लिप्यते, Pr. लिप्पइ. H. लिपै

312 लीप् or लेप् *smear* = Skr. लिप्, VI. cl. लिम्पति, Pr. लिंपइ (H. C. 4, 149), H. लीपै or लेपै. As to the change of इ to ए, see my Comp. Gramm. § 148.

313 लुड़् *roll* = Skr. लुड्, VI. cl. लुडति, Pr. लुडइ. H. लुड़ै. See Nos. 301, 314, 317.

314 लुढ़् *roll* = Skr. लुठ, VI. cl. लुठति, Pr. लुढइ. H. लुढ़ै.

315 लूट् or लूठ् *rob* = Skr. लुंट् or लुंठ् I. cl. लुण्ठति or लुण्ठयति, Pr. लुंटइ or लुंठइ. H. लूटै or लूठै.

316 ले *take* = Skr. लभ्, I. cl. लभते, Pr. लहइ or लेइ (H. C. 4, 238), H. लेय् or ले. The syllable लह is contracted into ले; similarly कह *speak* is sometimes pronounced के, and सह *bear*, से.

317 लोट् *roll about* = Skr. लुट्, VI. cl. लुटति, Pr. लोट्टइ (H. C. 4, 146 in the sense "rolling about in sleep"), H. लोटै.

318 लोभ् *be enamoured* = Skr. लुभ्, IV. cl. लुभ्यति, Pr. लुब्भइ (H. C. 4, 153), H. लोभै. As to the change of उ to ओ, see my Comp. Gramm. § 148.

319 वार् *surround* = Skr. वृ, Causal वारयति, Pr. वारेइ or VI. cl. वारइ, H. वारै.

320 सक् *can* = Skr. शक्, Passive शक्यते (used actively), Pr. सक्कइ (Vr. 8 52), H. सकै.

321 संघार or संहार् (or समार्) *destroy* = Skr. सम्-हृ, Causal संहारयति, Pr. संहारेइ or संघारेइ (cf. H. C. 1, 264) or VI. cl. संहारइ or संघारइ, H. संघारै or संहारै (or समारै). Or a denominative of संहार.

322 संच् *collect* = Skr. सम्-चि, Passive संचीयते (used actively), Pr. संचेइ (cf. H. C. 4, 241 उच्चेइ) or VI. cl. संचइ (as उड्डइ for उड्डेइ), H. संचै.

323 संठ् or सट् *be combined* = Skr. सम्-स्था, Passive संस्थीयते (used actively), Pr. संठेइ or VI. cl. संठइ (like उड्डेइ and उड्डइ), H. संठै or (corr.) सटै.

324 सड् or सर् *rot* = Skr. सद् (or शद्), I. cl. सीदति, but Vedic also सदति, Pr. सडइ (H. C. 4, 219; in Vr. 8, 51 it is ascribed to शद्), W. H. सड़ै or E. H. सरै.

325 सताव् *persecute, torment* = Skr. सम्-तप्, Causal सन्तापयति, Pr. संतावेइ or VI. cl. संतावइ, H. सतावै.

326 सद् *leak* = Skr. स्यंद्, I. cl. स्यन्दते, Pr. संदइ, H. सदै. As to elision of the nasal, see my Comp. Gramm. §§ 143, 146. See No. 353.

327 संभाल् or संहाल् or सम्हाल् *sustain* = Skr. सम्-भृ, Causal सम्भारयति, Pr. संभारेइ or VI. cl. संभारइ H. संभालै, &c. Or demon. root of सम्भार.

328 समाव् *be contained* = Skr. सम्-आप्, V. cl. समाप्नोति, Pr. X. cl. समावेइ H. C. 4, 142) or VI. cl. समावइ, H. समावै See No. 172.

329 समुझ् or समझ् *understand* = Skr. सम्-बुध्, IV. cl. सम्बुध्यते, Pr. संबुज्झइ, E. H. समुझै or W. H. समझै. See No. 242.

330 सर् *issue, be ended* = Skr. सृ, I. cl. सरति, Pr. सरइ (Vr. 8, 12); H. सरै.

331 सराह् *commend* = Skr. श्लाघ्, I. cl. श्लाघते, Pr. सलाहइ, (H. C. 2, 101 has सलहइ ?). H. सराहै.

332 सल् *pierce* = Skr. शल् or सल्, I. cl. शलति or सलति, Pr. सलइ. H सलै.

333 संवार् or सवार् or समार् *prepare* = Skr. सम्-वृ, Causal संवारयति, Pr. संवारेइ or VI. cl. संवारइ, H. संवारै, &c.

334 सह् *endure* = Skr. सह्, I. cl. सहते, Pr. सहइ (H. C. 1, 6). H. सहै.

335 सहर् *arrange* = Skr. सम् + हृ, I. cl. संहरति, Pr. संहरइ (H. C. 4, 259 = Skr. संवृणोति, in H. C. 4, 82 also साहरइ), E. H. सहरै.

336 साध् *settle* = Skr. साध्, Causal साधयति, Pr. साधेइ (cf. Spt. 188 साहेइ) or VI. cl. साधइ (cf. Spt. 260 साहइ), H. साधै. The form साह् does not occur in Hindí.

337 सार् *accomplish* = Skr. सृ, Causal सारयति, Pr. सारेइ or VI. cl. सारइ H. सारै.*

338 साल् *pierce* = Skr. शॄ, Causal शारयति, Pr. सारेइ or VI. cl. सारइ; H. सालै. Or from Causal of शल्, see No. 332.

339 साँस् *threaten, distress* = Skr. शंस्, Causal शंसयति, Pr. संसेइ or VI. cl. संसइ (H. C. 4, 197 where however it is = संसते), H. साँसै.

340 सी *sew* = Skr. सिव्, IV. cl. सीव्यति, Pr. VI. cl. सिअइ or सिवइ, H. सीऐ. H. C. 4, 230 gives सिव्वइ which would be सीवै in H., but it does not exist; there is, however, another reading सिचइ, H. सीचै which does exist, see No. 342.

341 सीख् *learn* = Skr. शिक्ष्, I. cl. शिक्षते, Pr. सिक्खइ (cf. Spt. 353), H सीखै.

342 सीच् or सींच or छींच् *irrigate* = Skr. सिच्, VI. cl. सिञ्चति, Pr. सिंचइ,

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* The root means also "*polish*" (by rubbing, striking); perhaps this is the सारइ mentioned by H. C. 4, 84 as equivalent to the Skr. प्रहरति,

(H. C. 4, 239) or सिचइ (H. C. 4, 230), H. सौँचै or सीचै or (corr.) छौँचै (cf. Vr. 2, 41 छत्त॰ = सप्त॰, Ls. 199.)

343 सीज *exude, sweat* = Skr. स्विद्, IV. cl. स्विद्यति, Pr. सिज्जइ (H. C. 4, 224), H. सीजै. See also No. 344.

344 सीज् *seethe, boil, exude, sweat* = Skr. श्रै (or श्रा), Passive श्रीयते, Pr. सिज्जइ, H. सीजै.

345 सीज *be received* (as money) *be liquidated* (as debt) = Skr. श्रि, Passive श्रीयते, Pr. सिज्जइ, H. सीजै.

346 सुधार् *adorn* = Skr. सु-धृ, Causal सुधारयति, Pr. सुधारेइ or VI. cl. सुधारइ, H. सुधारै.

347 सुन् *hear* = Skr. श्रु, V. cl. शृणोति, Pr. VI. cl. सुणइ (Vr. 8, 56), H. सुनै.

348 सुमर् *remember* = Skr. स्मृ, I. cl स्मरति, Pr. सुमरइ (Vr. 8, 18), H. सुमरै.

349 सुहाव् *be agreeable* = Skr. सुख्, X. cl. सुखयति Pr. सुहावेइ (Spt. 169) or VI. cl. सुहावइ, H. सुहावै.

350 सूँघ् *smell at* = Skr. सम्-आ-घ्रा, I. cl. समाजिघ्रति or II. cl. समाघ्राति, Pr. समग्घेइ or VI. cl. समग्घइ, H. सूँघै.*

351 सूँज् *swell* = Skr. श्वि, Passive शूयते, Pr. सुज्जइ, H. सूजै.

352 सूझ् *appear* = Skr. शुध्, IV. cl शुध्यति, Pr. सुज्झइ, (cf. H. C. 4, 217), H. सूझै.

353 सेँद् *irrigate* = Skr. स्यंद्, Causal स्यन्दयति, Pr. सिंदेइ or VI. cl. सिंदइ, H. सेँदै cf. No. 326.

354 सेव् or सेह् *serve, worship* = Skr. सेव्, I. cl. सेवते, Pr. सेवइ (H. C. 4, 396), H. सेवै or सेहै (with euphonic ह्, see my Comp. Gramm. § 69).

355 सोच् *regret, meditate* = Skr. शुच्, Passive शुच्यते (used actively) Pr. सुचइ, H. सोचै.

356 सोह् *shine, be fit* = Skr. शुभ्, I. cl. शोभते, Pr. सोहइ (H. C. 1, 187), H. सोहै.

357 सौंप् *deliver* = Skr. सम्-ऋ, Causal समर्पयति, Pr. समप्पेइ or VI. cl. समप्पइ. H. सौंपै. See No. 349, footnote.

358 हन् *kill* = Skr. हन्, II. cl. हन्ति, but Vedic also I. cl. हनति, Pr. हणइ. (H. C. 4, 418), H. हनै.

359 हर् *take away* = Skr. हृ, I. cl. हरति, Pr. हरइ (H. C. 4, 234), H. हरै.

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* ॰घ्रा would form ॰ग्घेइ or ग्घइ in Pr., just as ॰ट्ठेइ or ॰ट्ठइ of ॰स्था; and सम would contract to सूँ in Hindi, just as in सौंपै for Pr. समप्पइ, see No. 357; the intermediate form being सवग्घइ (cf. H. C. 4, 397). The root, however, might be derived from Skr. शिंघ्, I. cl. सिंघति, Pr. सिंघइ; only the Hindí ought to be सींघै; and the change of ई to ऊ would be very anomalous. (Dr. R. Mitra in his vocabulary quotes घ्रे गन्धोपादाने ?).

360 हरिस् or हरस् *be glad* = Skr. हृष्, I. cl. हर्षति, Pr. हरिसइ (Vr. 8, 11; perhaps denom. of हरिस = हर्ष Vr. 3, 62), E. H. हरिसै or W. H. हरसै. See No. 209.

361 हलप् *toss about* = Skr. ह्वल्, (Causal Passive ह्वलाप्यते), Pr. हलप्पइ, H. हलपै.

362 हवा *scream* = Skr. ह्वे, I. cl. ह्वयति, Pr. VI. cl. हवाअइ or (contr.) हवाइ, H. हवाय्.

363 हंस् or हाँस् *laugh* = Skr. हस्, I cl. हसति, Pr. हसइ (T. V. 2, 4. 69) or हस्सइ (Passive), H. हँसै or हाँसै.

364 हाँप् or हाँफ् *blow* = Skr. ध्मा, Causal ध्मापयति, Pr. धंपेइ or VI cl. धंपइ or हंपइ. H. हाँपै or (corr.) हाँफै.

365 हाल् intr. *shake* = Skr. ह्वल्, Passive ह्वल्यते (used actively), Pr. हल्लइ, H हालै. See No. 68.

366 हिल् intr. *shake* = Skr. ह्वृ, I. cl. ह्वरति, Pr. VI. cl. हिरइ or हिलइ, H. हिलै.

367 हुन् *sacrifice* = Skr. धू, V. cl. धुनोति, Pr. VI. cl. धुणइ or हुणइ (H. C. 4, 241 where it is referred to Skr. root हु), H. हुनै.

368 हूल् *drive, goad* = Skr. हूड् *go*, Causal हूडयति, Pr. हूडेइ or VI. cl. हूडइ, H. हूलै.

369 हो *be* = Skr. भू, I. cl. भवति, Pr. भवइ or हवइ or हुवइ or होइ (H. C. 4, 60), H. होय

PART II.—*Secondary Roots.*

Comp. = compound root; den. = denominative; der. = derivative; N. = noun; P. P. P. = past participle passive.

The Sanskrit equivalents are not given, unless when they actually exist; what theoretically they might have been, has been explained in the introductory remarks; see also my Comparative Grammar, §§ 351—354.

Some of the explanations attempted in this list, are, of course, only tentative; a few such have been indicated by a mark of interrogation.

1 comp. अटक *be hindered, stopped* = Skr. अट्ट + कृ, Pr. अट्टक्केइ or अट्टक्कइ, H. अटकै.

2 comp. उचक् *be raised, rise* = Skr. उच्च + कृ, Pr. उच्चक्केइ or उच्चक्कइ, H. उचकै.

3 comp. उबक् *vomit* = Skr. उद्-वम् + कृ, Pr. उव्वंकेइ or उव्वंकइ, H. उबकै.

4 comp. ऊक् or ओंक् *vomit* = Skr. वम + कृ, Pr. वमक्केइ or वमक्कइ, Ap. Pr. वँवँक्कइ, H. ओंकै or ऊकै (with ओ for अवँ or अम, see my Comp. Gramm. § 122).

5 der. उखड़् *be pulled out, slip out,* a passive or intransitive, derived from उखाड़्, see No. 6.

6 den. उखाड़् or उखेड़् *pull out, uproot* = Skr. P. P. P. उत्कृष्ट, Pr. उक्कड्ढइ (cf. H. C. 4, 187), H. उखाड़ै (for उकाढ़, with transferred aspiration, see my Comp. Gramm. § 132) or उखेड़ै (for उकेढै with change of *a to e*, see my Comp. Gramm. § 148). See No. 13.

7 den. ओढ़् *put on, dress* = Skr. उपवेष्ट, I. cl. उपवेष्टते, Pr. ओवेड्डइ. (cf. H. C. 4, 221), H. ओढ़ै (contracting ओवे to ओ). Probably from a P. P. P. of the root विष्.

8 comp. कड़क् *crackle, thunder* = Skr. कर्द + कृ, Pr. कड्डक्केइ or कड्डकइ, H. कड़कै.

9 den. कमाव् *earn* = Skr. N. कर्म; Pr. कम्मावेइ or कम्मावइ, (H. C. 4, 111 has कम्मवइ and gives it as a substitute of the root उपभुज्; the *á* is shortened to *a*, by H. C. 3, 150), H. कमावै.

10 comp. कसक् *be painful, be pained* = Skr. कष + कृ, Pr. कसक्केइ or कसक्कइ, H. कसकै.

11 der. कट् *be cut,* a passive or intransitive, derived from root काट्, see primary roots, No. 27.

12 der. कढ़् *be pulled out, escape,* a passive or intransitive, derived from root काढ़्. See No. 13.

13 den. काढ़् *pull out* = Skr. P. P. P. कृष्ट; Pr. कड्ढइ (H. C. 4, 187), H. काढ़ै.

14 comp. खरक् or खड़क् *make a tremulous noise, rustle, rattle* = Skr. स्खल + कृ; Pr. खल्लकइ or खडकइ, H. खरकै or खड़कै. There is also a reduplicated root खरखर् or खड़खड़् of the same meaning. They also occur in Maráṭhí and Panjábí. The primary meaning of the root is; *slip* or *glide along with a sound;* this is preserved in the Maráṭhí खरक् or खड़क् which is used of the running of a stream, or the crashing of a boat, dragged over gravel, &c. The simple root खड़् occurs in Maráṭhí with its original meaning *be shed, fall off;* also in Panjábí, where however it has become transitive, *carry off.* The change of ल or र to ड or ड़ is anomalous; but it already took place in Prákrit; thus in Spt. 44, अक्खडइ for Skr. आस्खलति, Spt. 195 खडिअ for Skr. स्खलित. Perhaps there may be a connection with the root स्कंद्; compare also the roots चर् and चल्. See also roots घरक् and फरक्.

15 der. गड़् *be hollowed, be sunk,* a passive or intransitive, derived from root गाड़्; see No. 16.

16 den. गाड़् *hollow, bury* = Skr. N. गर्त, Pr. गड्ड (Vr. 3, 25), Pr. गड्डेइ or गड्डइ, H. गाड़ै. Or possibly a mere corruption of root गाढ़्, No. 17, by disaspiration.

17 den. गाड़् *dig in, fix in, bury* = Skr. P. P. P. गाढ (of root गाह्), Pr. गाढइ, H. गाढ़ै.

18 den. गोद् *mark, brand* = Skr. N. गोदं ; Pr. गोदेइ or गोदइ, H. गोदै (?) ; brands being made on the forehead or bosom.

19 den. घबराव् *be alarmed, agitated*, perhaps corrupted form गड़बड़ाव् with the same meaning, a reduplicative or alliterative form, made from गड्ड = Skr. N. गर्द *noise, cries of alarm* (?).

20 den. घिनाव् or घिनियाव् *be disgusted* = Skr. N. घृणा or deminutive घृणिका (of root घृण्), Pr. घिणा (H. C. 1, 128) or घिणिआ ; Pr. घिणावेइ or घिणिआवेइ or घिणावइ or घिणिआवइ. H. घिनावै or घिनियावै.

21 der. घिर् *be collected, surrounded, gather*, a passive or intransitive of root घेर्. See primary roots, No. 64.

22 comp. चपक् *be compressed, collapse* = Skr. चप or चपं + कृ, Pr. चप्पक्केइ or चप्पक्कइ. H. चपकै.

23 comp. चमक् *glitter* = Skr. चमत् + कृ, pass. चमत्क्रियते (with active meaning), Pr. चमक्केइ or चमक्कइ. H. चमकै.

24 den. चाह् *wish*, corrupted for छाह्, see No. 40.

25 der. चिर् *be torn, split*, a passive or intransitive, derived from root चीर्; see No. 31.

26 den. चिकनाव् *smooth, polish* = Skr. N. चिक्कण (or चिक्किण ; perhaps itself a compound word of चित् *bright* = चिच, and कृ = Pr. किण ; lit. *made clear*) ; Pr. चिक्कणावेइ or चिक्कणावइ, H चिकनावै.

27 den. चिढ़ाव् or चिड़ाव् *abuse, vex* = Skr. P. P. P. क्षिप्त (from root क्षिप् *abuse*) ; Pr. छिडावइ, H. चिढ़ावै (with transfer of aspiration) or चिड़ावै (with loss of aspiration). As to the changes of aspiration, see No. 47 छेड़् or छोड़्, where it is preserved ; also primary root, No. 65 चढ् (footnote, p. 45). As to the change of प्त to त्त to ड (or ड़), compare root जुड़ाव् from P. P. P. युक्त ; and primary roots Nos. 92, 93 जुट् and जोड़्.

28 den. चिताव् *make known to, warn, admonish* = Skr. P. P. P. चित्त ; Pr. चित्तावेइ or चित्तावइ (cf. S. B. 11, 1), H. चितावै. In Setubandha 11, 1 occurs the past participle चित्तविअं (with *a* for *á*, by H. C. 3, 150), which is correctly explained by the commentator as meaning चेतितं *made known to*, or निवृत्तं *restrained, warned* (or निर्वृत्तं), परितोषितं *admonished, comforted ;* (see S. Gdt. pp. 84, 156).

29 den. चीत् *paint* = Skr. N. चित्र ; Skr. चित्रयति, Pr. चित्तेइ or चित्तइ, H. चीतै.

30 den. चीन् or चीह्न् *recognize* = Skr. N. चिह्न, Pr. चिण्ह (H. C. 2, 50) ; Skr. चिह्नयति, Pr. चिण्हेइ or चिण्हइ, H. चीह्नै or चीनै.

31 den. चीर् *tear, cleave* = Skr. N. चीर *(rag)*, whence Skr. चीरयति, Pr. चीरेइ or चीरइ. H. चीरै.

32 comp. चुक् *be finished, cease* = Skr. च्युत् + कृ; Pr. चुक्कइ (H. C. 4, 177), H. चुकै. H. C. gives it as a substitute of the Skr. root भ्रंश् *fall down, decay*, a synonym of च्युत्; so also the commentator to Spt. 323, see Wb. p. 184. The correct derivation from च्युत् is given by the commentator on Setubandha 1, 9. The Skr. root चुक्क् *inflict pain*, X. cl. चुक्कयति, is doubtlessly reintroduced from the Prákrit. See No. 33.

33 comp. चूक् *blunder, miss* = Skr. च्युत् + कृ; Pr. चुक्कइ, H. चूकै. This is clearly identical with the former, as regards origin. The original meaning "fall," "drop," (from the truth) would easily lead to "blunder." In this sense it is well-known to Prákrit; *e. g.*, Spt. v, 323, चुक्कसंकेआ "blundered or missed meeting"; again Spt. v. 199, Setubandha 1, 9, where the commentary correctly explains it प्रमादे देशी इति केचित्, *i. e.*, according to some it is a desí word meaning "blundering" (See S. Gdt., p. 157). See No. 32.

34 den. चोराव् *steal* = Skr. N. चोर or चौर; Pr. चोरावेइ or चोरावइ, H. चोरावै.

35 comp. चौंक् *start (from fright)* = Skr. चमत् + कृ, passive चमत्क्रियते (used actively), Pr. चमक्केइ or चमक्कइ, Ap. Pr. चवंक्कइ, H. चौंकै.

36 der. छन् *be strained, filter*, a passive or intransitive derived from छान्, No. 38.

37 den. छल् *deceive, cheat* = Skr. N. छल; Skr. छलयति, Pr. छलेइ or छलइ, H. छलै.

38 den. छान् *strain, search* = Skr. P. P. P. स्यन्न (of root स्यंद्), Pr. *सन्नेइ or छन्नेइ (Ls. 199) or छन्नइ, H. छानै (?).

39 den. छाप् *stamp, print*; an active or transitive derived from root छप्; perhaps merely another form of root चाप्; see Appendix Nos. 4 and 13.

40 den. छाह् or चाह् *wish* = Skr. N. उत्साह; Pr. उच्छाहेइ (cf. H. C. 2, 22) or उच्छाहइ, H छाहै or (disaspirated) चाहै; or from Skr. N. इच्छा, Pr. इच्छाएइ or इच्छाअइ, H. चाहै (with transferred aspiration) or छाहै. As to the elision of initial उ or इ, see my Comp. Gramm. § 173 (cf. Addenda); and as to the change of aspiration, *ibidem* § 132.

41 comp. छिटक् *be dispersed, be scattered* = Skr. क्षिप्त + कृ; Pr. छिट्टकेइ or छिट्टकइ, H. छिटकै. See No. 46.

42 den. छिड़् *be vexed, take offence*, a passive or intransitive, derived from R. छोड़् or छेड़्, No. 46.

43 comp. छिड़क् *sprinkle* = Skr. स्पृष्ट + कृ; Pr. छिडक्केइ or छिडक्कइ, H. छिड़कै. As to the derivation of छिड from Skr. स्पृष्ट, see No. 45 छोट्; and as to the softening of the final, छोट is to छिड़, as जुट to जोड़, q. v.

44 den. छींक् *sneeze* = Skr. N. छिक्का; Skr. छिक्कयति, Pr. छिक्केइ or छिक्कइ, H. छींकै. The word छिक्का, however, is itself a compound from छित् *sneezing* and क; and the word छित् is probably another form of क्षुत् *sneezing*, from Skr. root क्षु *sneeze*.

45 den. छीट् or छींट् or छेंट् *sprinkle* = Skr. P. P. P. स्पृष्ट *sprinkled*, Pr. छिट्ठ (with छि for स्पृ, as in छिचइ or छिवइ or छिप्पइ, H. C. 4, 182. 257; see also primary roots Nos. 78, 80); Pr. छिड्डेइ or छिड्डइ, H. छीटै or छींटै or छेंटै (on disaspiration see my Comp. Gramm. § 145, Exc. 2; on the anunásika, § 149; and on the change of इ to ए, § 148). Or from Skr. N. सेक (of root सिच्), see primary root No. 342.

46 den. छोड् or छेड् *abuse, vex* = Skr. P. P. P. क्षिप्त *abused;* Pr. छेडेइ or छेडइ, H. छेड़ै or छोड़ै. See Nos. 27, 42. Probably from क्षिप्त was derived a root छिट्, just as Skr. root जुट् from युक्त; the causal of छिट् would be छेटि, just as causal जोटि of जुट्; whence we should have Pr. छेडेइ, just as Pr. जोडेइ, and H. छेड़ै just as H. जोड़ै. The root छिट् which would correspond to जुट् does not exist in Hindí, except in the compound छिटक्, see No. 41. A similar series of roots are छुट् or छूट् and छोड्.* Possibly also Nos. 43 and 45, may be derived from क्षिप्त.

47 den. छीन् *take away, snatch* = Skr. P. P. P. छिन्न (of root छिद्), Pr. छिन्नेइ or छिन्नइ, H. छीनै.

48 den. छुट् or छूट् *be let off, be released* = Skr. P. P. P. क्षिप्त, Pr. छुत्त (H. C. 2, 138) or छुड्ड (S. C. 1, 3, 142 छूट ?); Pr. छुड्डेइ or छुड्डइ, H. छुटै or छूटै. See Nos. 46 and 50. The root छुट् or छुंट् has not been adopted into Sanskrit, except in its causal or transitive form क्षोट्.†

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* There would be the following series of forms:

Skr. युक्त, Pr. जुत्त or जुड्ड; Roots Skr. जुट्, Pr. जुड्ड् or जुड्, H. जुट् or जुड़्. Caus. जोड़्
,, क्षिप्त, ,, छुत्त ,, छुड्ड; ,, ,, छुट्, ,, छुड्ड् ,, छुड्, ,, छुट् ,, छुड़् ,, छोड़्
,, क्षिप्त, ,, छित्त ,, छिड्ड; ,, ,, छिट्, ,, छिड्ड् ,, छिड्, ,, छिट् ,, छिड़्, ,, छेड़्.

The Pr. roots in ड्ड् would seem to be the original derivatives from the Skr. P. P. P.; they were reintroduced into Sanskrit with one final ट्, and afterwards gave rise to the alternative Pr. root in ड्, by the ordinary phonetic change of ट् to ड्. The two alternative Pr. roots in ड्ड् and ड्, reappear in H. as roots in ट् and ड़्. As to the Skr. root छुट्, see footnote to No. 48. The root छिड्ड् appears to have been little used; it is not mentioned among Skr. roots, nor does it survive in Hindí, except in छिटक, see No. 41.

† The root छुट् does exist in Skr., but it has assumed a somewhat different, though connected meaning "*cut*" (whence H. छुरी *knife*). The same transition of

49 den. छेद् *perforate* = Skr. N. छिद्र (of R. छिद्); whence Skr. छिद्रयति, Pr. छिद्देइ or छिद्दइ, H. छेदै.

50 der. छोड् *release*, an active or transitive, derived from R. छुट् No. 48. Compare Skr. root छोट्.

51 den. जुगाव् *pair off labor* (i. e., *assist another with labor, in expectation of similar assistance being returned hereafter)* = Skr. N. युग्म, Pr. जुग्ग (H. C. 2, 78); Pr. जुग्गावेइ or जुग्गावइ, H. जुगावै. The root comes to mean generally: *be provident, be careful of.*

52 den. जताव् *make known, warn* = Skr. P. P. P. ज्ञप्त (of caus. of R. ज्ञा); Pr. जत्तावेइ or जत्तावइ, H. जतावै.

53 den. जम् *germinate* = Skr. N. जन्म, Pr. जम्मेइ or जम्मइ (H. C. 4, 136), H. जमै

54 den. जीत् *overpower, win* = Skr. P. P. P. जीत (of R. ज्या); Pr. जित्तेइ or जित्तइ, H. जीतै.

55 der. जुड् *be joined*, a passive or intransitive, derived from root जोड् see No. 57.

56 den. जुट् *unite* = Skr. P. P. P. युक्त, Pr. जुत्त (H. C. 1, 42) or जुट्ट, (see Nos. 46, 48), Pr. जुट्टेइ or जुट्टइ, H. जुटै. Compare Skr. root जुट्.

57 der. जोड् *join*, an active or transitive, derived from root जुट्, see No. 56.

58 den. जोत् *yoke* = Skr. N. योक्त्र, Skr. योक्त्रयति, Pr. जोत्तेइ or जोत्तइ, H. जोतै.

59 den. जोह् or जोव् or जो *see* = Skr. N. ज्योतिस् *eye, sight;* Pr. जोएइ (H. C. 4, 422, 6) or जोअइ (cf. H. C. 4, 332 जोअंतिहे), H. जोऐ or जोवै or जोहै (with euphonic व् and ह्, see my Comp. Gramm. § 69).

60 comp. झटक् tr. *twitch*, intr. *shake* = Skr. झट + कृ; Pr. झडक्केइ or झडक्कइ, H. झटकै. As to the derivation of झट, see primary root झाँट् No. 96.

61 comp. झपक् intr. *spring;* tr. *throw on, move to and fro, snatch* = Skr. झंप + कृ; Pr. झंपक्केइ or झंपक्कइ, H. झपकै. Hemachandra 4, 161 notices the corresponding uncompounded verb झंपइ, but only as an intransitive "move to and fro" (said to be = Skr. भ्रमति). Hindí and Maráṭhí have the same uncompounded verb झाँपै, but as a transitive, "cover with a thatch" (lit., *throw on*, i. e., bundles of

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meaning may be observed in another series of Skr. roots, which also are derived from क्षिप्त. The latter becomes in Pr. खित्त (H. C. 2, 127) or खुत्त (Spt. v. 278) or खुट्ट; whence Pr. den. roots खुट्ट् or खुड् (H. C. 4, 116 खुट्टइ and खुडइ *he breaks*), H. खूट् (खुड् does not exist). This root खुड् as well as the corresponding causal or transitive forms खोट् or खोड् have been adopted into Sanskrit. See primary root No. 41.

grass.)* As to the derivation of झंप, see Appendix No. 6. Hindí has an adverb झप् *quickly;* it has also another kind of compound root झपट् with the same meaning as झपक्. On these obscure compound in ट् roots, see my Comp. Gramm. § 354, 2.

62 comp. झलक् *shine, glare* = Skr. ज्वला + कृ; Pr. झलक्केइ or झलक्कइ, H. झलकै. As to the derivation of झल, see primary root No. 98.

63 den. झाँक् *peep, spy* = Skr. N. अध्यक्ष; Pr. अज्झक्खइ, H. झाँकै (with loss of initial अ, and disaspiration)?

64 comp. झीँक् *sigh, lament* = Skr. शीत् + कृ; Passive शीत्क्रीयते (used actively), Pr. झिक्केइ or झिक्कइ, H. झीँकै.

65 comp. झुक् or झोक् *stagger, nod, bend* = Skr. क्षुभ् (acc. sg. neut. क्षुप्) + कृ; Pr. झुक्कइ, H. झुकै or झोकै.

66 comp. झोक् or झोँक् *throw, cast* = Skr. क्षेप (or क्षप) + कृ; Pr. झोवक्कइ, H. झोँकै or झोकै. As to ओ = अव, see my Comp. Gramm. § 122?

67 der. टिक् *be propped, stay,* a passive or intransitive, derived from No. 68.

68 comp. टेक् *prop, support* = Skr. स्ताय (of root स्त्यै) + कृ; Pr. टायक्कइ, H. टेकै?

69 den. ठठ् *fix, arrange* = Skr. P. P. P. स्तब्ध (of root स्तंभ्); Pr. ठड्डेइ or ठड्डइ, H. ठठै. The hardening of ड् to ठ is probably caused by the influence of the initial ठ. In old Hindí ठड्डै occurs in the sense of "stopping short", "standing amazed". When the past participle is used as such (not as an element of a denominative verb), the original ड is still preserved in Hindí; thus old Hindí ठाढ, modern Hindí ठडा "standing".

70 comp. ठठक् or ठिठक् *stop short, stand amazed* = Skr. स्तब्ध + कृ; Pr. ठड्डक्कइ, H ठठकै or ठिठकै. As to the derivation of ठठ, see No. 69; as to ड for ब्ध, see my Comp. Gramm § 35.

71 comp. ठनक् *jingle, tinkle, &c.* = Skr. स्तन *sounding* + कृ; Pr. ठनक्केइ or ठनक्कइ, H. ठनकै. Compare Skr. टंकार *clang, twang,* &c. from टं + कृ; ट or ठ means any "sound."

72 comp. ठमक् *strut* = Skr. स्तम्भ + कृ; Pr. ठम्भक्कइ or ठम्हक्कइ. H. ठमकै. Skr. स्तम्भ becomes Pr. थंभ or ठंभ (H. C. 2, 9, whence H. थाम् *prop, pillar* and ठाम् *place, residence.* The change of म्भ to म्ह to म may be observed in the primary roots Nos. 117, 118.

73 comp. ठसक् *knock, chip* = Skr. त्वच + कृ, see root ठाँस् No. 10. in Appendix. Hindí has an interjection ठस्, imitating the sound of *knocking* or *hammering;* also ठसनी *rammer* (an instrument).

74 den. ठहर् *be fixed, remain,* another form of No. 75; possibly arisen by

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* Panjábí has झंबे, with ब् for प्; and झाँफ् *thatch,* with फ् for प्. The former might be referred to the Skr. root झंब्.

a mere transposition, ठढ़् *thaṛh* = ठड़ह् *thaṛah* = ठहड़् *thahaṛ* = ठहर् *thahar*. Or the element र may be the same as र or ल in टहर् or टहल्, &c. (see my Comp. Gramm. § 354, 2), and ठह = Pr. ठद = Skr. स्तब्ध. Hindí has the noun ठाहर् *place.*

75 den. ठाढ़् or ठाड़् *be fixed, be erect, stand* = Skr. P. P. P. स्तब्ध, Pr. ठड्ढ (H. C. 2, 39); Pr. ठड्ढेइ or ठड्ढइ, H. ठाढ़ै or ठाड़ै.

76 den. डर् *fear* = Skr. N. दर, Pr. डर (H. C. 8, 217); Pr. डरइ (H. C. 4, 198), H. डरै.

77 den. डाह् *be hot, burn* = Skr. N. दाह, Pr. डाह (H. C. 1, 217); Pr. डाहेइ or डाहइ, H. डाहै.

78 comp. ढक् *cover* = Skr. N. स्थग् (acc. sing. neut. स्थक् *covering*) + क; Pr. ढक्कइ (H. C. 4, 21), H. ढकै See primary root No. 105.*

79 der. ढल् or ढर् *flow*, a passive or intransitive of root ढाल् or ढार्, see Appendix No. 11.

80 comp. थक् or थाक् *be wearied, be fatigued* = Skr. स्तभ् (acc. sing. neut. स्तप्) + क; Pr. थक्केइ (H. C. 4, 370) or VI. cl. थक्कइ (H. C. 4, 87. 259; where it is said to be a substitute of Skr. फक्कति *move slowly from fatigue)*, H. थकै or थाकै. In H. C. 4, 16 the root is given as an equivalent of स्था *stand;* the Bangálí has थाक् (pronounced *thak*) *stay, remain.* The original meaning of the Hindí is *to come to a stop* (from fatigue). The Skr. passive स्तभ्यते (= स्तप्+क्रीयते) means "*to be made firm or rigid, be paralysed, be stopped.* The original meaning of "rigidity" is preserved in the Hindí थक् or थक्क *a congealed lump, a clot.* The stoppage may be owing to fatigue or to wonder; hence Hindí थकित् *stopped* or *wearied* or *astonished.* Other derivatives of the Hindí root are अथक् *unwearied*, थकावत् *weariness*, थकाफका *perplexed.*†

81 comp. थपक् *strike, slap, tap* from थप + क; as to the derivation of थप, see root थाप् in the Appendix No. 13.

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* It might be also derived, as a primary root, from Skr. तक्ष्, I. cl. तक्षति, Pr. तक्खइ = थक्कइ (with transfer of aspiration) = ढक्कइ (softening and cerebralising थ). Compare the roots ठाँस्, ठक्, ठेस्, ठोक् in the Appendix, which show that the Skr. roots तक्ष् and त्वक्ष् had a tendency in Prákrit to transfer the aspiration (थ) and cerebralise the initial (ठ). The Skr. root तक्ष् means *chipping off* (by striking) and *covering;* a similar change of meaning appears in the Hindí root मढ़् *cover* from Skr. मृश् *rub, strike.*

† S. Goldschmidt, *Prákṛitica*, No. 7, p. 5 derives it, as a denominative root, from P. P. P. थग्ध of a root थंघ्, which he identifies with the root स्तंभ, and assumes a change of ग्ध to क्क. This theory is based on three hypothetical steps: the identity of थंघ् and स्तंभ्, the existence of a P. P. P. थग्ध, the change of ग्ध to क्क. Pischel in *Bezzenberger's Beiträge* III, 235 derives it simply from a hypothetical Skr. root स्थक्.

82 comp. थल्हक् or थरक् *tremble, flutter* ; probably a mere various pronunciation of खरक् or फरक्, q. v. ; the interchange of फ and थ is shown by the Pr. फक्कइ and थक्कइ (H. C. 4, 87), and that of ख and थ by खंभो and थंभो (H. C. 2, 8). There is also a reduplicated root थलथल् or थरथर् corresponding to खरखर् and फरफर्.

83 comp. थिरक् *be set, be settled, well postured* (e. g., in dancing) = Skr. स्थिर + कृ ; Pr. थिरक्केइ or थिरक्कइ, H. थिरकै.

84 den. थिराव् intr. *settle* (as liquor) = Skr. N. स्थिर ; Skr. स्थिरायति Pr. थिरावेइ or थिरावइ, H. थिरावै.

85 comp. थुक् *spit* = Skr. ष्ठेव (or ष्ठीव) + कृ ; Pr. थुक्केइ or थुक्कइ, H. थूकै. As to the contraction of एव to उ or ऊ, see my Comp. Gramm. § 122.

86 den. दउड़् or दौड़् *run* = Skr. N. द्रव, Pr. diminutive दवड ; Pr. दवडेइ or दवडइ, E. H. दउड़ै or W. H. दौड़ै. In Chaṇḍa's Prákrit Lakshaṇa C D, II, 27*h*, there is noticed a root डवडव *run about with lowering face* (अतिरभसाद् ऊर्द्धमुखस्य इतस्ततो गमने डवडव); Maráṭhí has both डवडव and डवड in the same sense; it has also दवड *run ;* these two roots are probably identical, the change of initial द to ड being not uncommon ; see H. C. 1, 217.

87 comp. दरक् intr. *split* = Skr. दर + कृ ; Pr. दरक्केइ or दरक्कइ, H. दरकै.

88 comp. दहक् intr. *burn* = Skr. दह + कृ ; Pr. दहक्केइ or दहक्कइ, H. दहकै.

89 den. दुख् intr. *pain* = Skr. N. दुःख ; Skr. दुःखयति, Pr. दुक्खेइ or दुक्खइ. H. दुखै.

90 comp. धडक् *blaze, be hot* (from any passion), *be distressed, tremble* (from fear), = Skr. दग्ध + कृ, Pr. दड्ढक्कइ, H. धडकै (for दडकै, with transfer of aspiration). There is also reduplicated root धडधड*.

91 den. धार् *pour* = Skr. N. धार ; Pr. धारेइ or धारइ, H. धारै.

92 comp. धौंक् or धौक् *blow, breathe upon* = Skr. धम + कृ ; Pr. धमक्केइ or Ap. Pr. धवंक्कइ, H. धौंकै.

93 den. नट् *dance* = Skr. N. नर्त्त ; Skr. नर्त्तयति, Pr. नट्टेइ or VI. cl. नट्टइ (H. C. 4, 230. 2, 30), H. नटै. The Skr. root नट (I. cl. नटति or X. cl. नाटयति) is adopted from the Prákrit.

94 der. नह् *flow*, a passive or intransitive, derived from primary root नहा No. 136.

95 den. नहाट् *flee* = Skr. P. P. P. खस्त (of R. खस् *eject*) ; Pr. णहट्टइ, E. H. नहाटै. Compare Pr. पल्हट्टइ (H. C. 4, 200) from Skr. पर्यस्त.

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* Hindí has a word धड् *body*, and धड् *firm, strong, sound.* This is probably derived from Skr. दृढ = Pr. दढ = H. धड.

96 der. निकल् or निकर् *be pulled out, come out;* a passive or intransitive, derived from root निकाल्. See No. 98.

97 der. निकस् *be expelled, come out;* a passive or intransitive, derived from root निकास्. See primary root No. 139.

98 den. निकाल् or निकार् *pull out, eject* = Skr. P. P. P. निष्कृष्ट; Páli and Pr. निकड्ढइ. Pr. निकल्हइ or निक्कालइ, W. H. निकालै or E. H. निकारै. As to the change of ढ to ल्ह, see my Comp. Gramm. § 115.*

99 den. निखोड़् or निखोर् *peel, extract* = Skr. P. P. P. निष्कृष्ट; Pr. निक्कोड्ढइ (with *o* for *u*, by H. C. 1, 116) or निक्खोडइ (with transfer of aspiration, as in अक्खोडइ H. C. 4, 188 = अक्कोड्ढइ, a denominative of आकृष्ट *extracted).*

100 den निकोस् *grin* = Skr. N. निकुस्मय (from root नि + कु + स्मि); Skr. निकुस्मयते, Pr. निकोस्सेइ or VI. cl. निकोस्सइ (cf. H. C. 1, 116), H. निकोसै. See my Comp. Gramm. § 148.

101 den. निगल् *swallow* = Skr. N. निगल; Pr. निगलेइ or VI. cl. निगलइ, H. निगलै. It might, however, be a primitive root = Skr. नि + गृ, VI. cl. निगिलति, with change of र to ल.

102 den. निपट् *terminate* = Skr. N. निष्पत्ति (from root निस् + पद्); Pr. निप्पट्टेइ or VI. cl. निप्पट्टइ, H. निपटै (?). As to the change of dental त्त to cerebral ट्ट, compare Pr पट्टणं for Skr. पत्तनं, Vr. 3, 23; cf. also Pr. पडइ for Skr. पतति Vr. 8, 51.

103 der. निबह् or निभ् *be accomplished, succeed,* a passive or intransitive root, derived from the primary root निबाह्, No. 146.

104 den. पइठ् or पैठ् *enter* = Skr. P. P. P. प्रविष्ट, Pr. पइट्ठ (H. C. 4, 340); Pr. पइट्ठेइ or VI. cl. पइट्ठइ. E. H. पइठै or W. H. पैठै.

105 den. पक् *ripen* = Skr. P. P. P. पक्व, Pr. पक्क (H. C. 2, 79); Pr. पक्केइ or पक्कइ, H. पकै.

106 den. पकड़् *seize* = Skr. P. P. P प्रकृष्ट; Pr. पकड्ढइ (cf. H. C. 4, 187), H. पकड़ै (for पकढ़ै, with lost aspiration, as in root गाड़् No. 16, उखाड़् No. 6, ठाड़् No. 75, and others).

107 den. पछताव् *repent* = Skr. N. पश्चात्ताप; Pr. पच्छत्तावेइ or VI. cl. पच्छत्तावइ, H. पछतावै.

108 den. पट् *be paid, be roofed, be watered* = Skr. N. पत्र or पट्ट or पट; Pr. पट्टेइ or VI. cl. पट्टइ, H. पटै. Skr. पत्र is any "vessel", used for irrigating; पट्ट is the table or leaf on which the accounts of payments are kept; पट means a "roof."

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* So also Bs. I, 354. III, 58. The Hindí root निकाल् is, of course, referable to the Skr. root निस् + कल्; but the latter is most probably itself adopted from the Prákrit; Skr. निष्कालयति = Pr. निक्कालेइ. The Pr. form निक्खालेहि, quoted by Bs. III, 58, is misspelt for निक्कालेहि.

109 den. पनप् *expand, grow, prosper* = Skr. N. प्रपञ्च (of root प्र-पंच), Skr. प्रपञ्चयति, Pr. पपञ्चेइ or पपञ्चइ (cf. Pr. पञ्चासा = Skr. पंचाशत्. H. C. 2, 42), H. पनपै (transposed from पपनै, see my Comp. Gramm. § 133, see also primary roots Nos. 165, 166).

110 den. पनियाव् *irrigate* = Skr. N. पानीय, Pr. पाणिअ (H. C. 1, 101), Pr. पाणिआवेइ or पाणिआवइ, H. पनियावै (see my Comp. Gramm. § 25).

111 den. परिस् or परस् *touch* = Skr. N. स्पर्श, Pr. फरिस (Vr. 3, 62); Pr. फरिसइ (H. C. 4, 182), H. परिसै or परसै (with lost aspiration, and change of *i* to *a*; see my Comp. Gramm. §§ 58 note, 130).

112 den. पलट् or पलथ् intr. *turn over* = Skr. P. P. P. पर्यस्त, Pr. पल्लट्ट or पल्लत्थ (Vr. 3, 21. H. C. 2, 47), Pr. पल्लट्टइ or पल्लत्थइ (H. C. 4, 200), H. पलटै or पलथै. In H. C. 4, 200. 258 पल्हत्थ and पल्हत्थइ are spelled so; see my Comp. Gramm. § 161.

113 den. पहिचान् or पहचान् *recognise* = Skr. N. परिचयन; Pr. परिचअणेइ or परिचअणइ, H पहिचानै or पहचानै (for परचानै; with elided र् and inserted euphonic ह्, see my Comp. Gramm. §§ 69, 124) (?).

114 der. पिहन or पहिन् intr. *dress, put on*, a passive or intransitive, derived from the primary root पिहनाव् or पहिनाव्, No. 165.* See also primary root पहिर् No. 166.

115 comp. पिचक *be squeezed, be shrivelled* = Skr. पिच्च + क; Pr. पिच्चक्केइ or पिच्चक्कइ, H. पिचकै Compare Skr. पिच्चिट *squeezed;* and as regards the derivation of पिच्च or पिच, see primary root पीच No. 175. The word has been adopted into Skr. from the Prákrit.†

116 den. पिछल् or फिसल् *slip* = Skr. N. पिच्छिल or पिच्छल slippery; Pr. पिच्छलेइ or पिच्छलइ, H. पिछलै or फिसलै. (transferring the aspiration to प and changing छ to स; see my Comp. Grammar § 11). See No. 125.

117 der. पिट् *be beaten*, a passive or intransitive, derived from root पीट No. 119.

118 der. पिल् *be beaten, bruised*, a passive or intransitive, derived from root पेल्, No. 121. See also No. I, 184.

119 den. पीट् *beat* = Skr. P. P. P. पिष्ट; Pr. पिट्टेइ (Spt. 173) or पिट्टइ (with ट्ट for ड्ड, as in पल्लट्टइ for पल्लड्डइ (H. C. 4, 200), H. पीटै. See No. 121.

120 den. पुकार् *call, shout* = Skr. N. स्फूत्कार or फूत्कार or पूत्कार; Pr. फुक्कारेइ

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* In Bengálí the root is पिनध्, which is a denominative of the Skr. P. P. P. पिनद्ध *dressed.* Possibly the Hindí root may be explained in the same way by a further change of ध् to ह.

† In the Skr. word चिपिट *pressed down* a metathesis of प and च appears to have taken place.

or पुक्कारेइ or पुक्कारइ, H. पुकारै. A similar change of फ to प, in root परिस् No. 111. An intransitive or passive form of this root occurs in the old Hindí of Chand's Prithiráj Rasau: पुक्कर् *be called.*

121 den. पेल् *squeeze, beat* = Skr. P. P. P. पिष्ट ; see primary root No. 184.

122 den. पुन् *revile,* perhaps = Skr. N. पुण्य *blessed ;* euphuistically.

123 comp. फटक् tr. *separate, winnow,* or intr. *be separated* = Skr. स्फट + कृ ; Pr. फट्टक्केइ or फट्टक्कइ, H. फटकै. The Pr. doubles the radical ट ; see primary root फट् No. 186.

124 comp. फरक् or फड़क् *tremble* = Skr. स्फर + कृ ; Pr. फरक्केइ or फरक्कइ, H. फरकै or फड़कै. The reduplicated root फरफर् or फुरफुर् also occurs. See roots थरक् No. 82 and खरक् No. 14.

125 den. फिसल् *slip, slide,* see No. 116. For a similar transfer of aspiration on account of change of छ to स, see root ठस् in Appendix No. 8.

126 comp. फूँक् *blow* = Skr. फूत् + कृ ; Pr. फुक्केइ or फुक्कइ, H. फूँकै. See H. C. 4, 422, 3. फुक्किज्जंत, and Spt. 178 फुक्कंतय.

127 der. फुक् *be blown,* a passive or intransitive, derived from root फूँक् No. 126.

128 den. बइठ् or बैठ *sit* = Skr. P. P. P. उपविष्ट, Pr. उवइट्ठ (like पइट्ठ, No. 104) or ओइट्ठ (cf. H. C. 1, 173), H. बइठै or बैठै (as to change of ओ to व, see my Comp. Gramm. § 71). The initial ब for व is somewhat anomalous, as such an "expansion" व does not ordinarily harden to ब. Another way of explaining the Hindí बइठ् is to assume that the initial उ of Pr. उवइट्ठ has been dropped (so in my Comp. Gramm § 173, and Bs. I, 179. III, 38); but this does no more obviate the anomaly ; for a Pr. व, softened from Skr. प, does not, as a rule, harden in Hindí.

129 comp. बक् *talk, chatter* = Skr. वाच् + कृ ; Pr. वक्कइ, H. बकै. Or possibly a mere corruption for बुक्, Pr. बुक्कइ or बुक्कइ (H. C. 4, 98), Skr. बुक्कति or बुक्कयति a comp. of ब्रू + कृ. Hindí does not possess the form बुक्, but it has a derivative of it, बुकलाव्; Maráṭhí has both बुक् and बुकल्.

130 den. बाँच् *read, recite* = Skr. N. वाच्य ; Pr. वच्चइ, H. बाँचै.

131 comp. बहक् *go beyond bounds, stray* = Skr. बहिस् + कृ ; Pr. बहिक्केइ or बहिक्कइ, H. बहकै.

132 der. बिथर् *be spread,* a passive or intransitive, derived from the primary root बिथार् No. 225.

133 den. बिराव् *mock, jeer* = Skr. N. विराव *sound, noise ;* Pr. विरावेइ or विरावइ, H. बिरावै.

134 den. बिलट् *become bad,* perhaps connected with P. P. P. विलम्बित (विलप्त ?) *wasted.*

135 den. बौट् *scatter, spill* = Skr. P. P. P. व्यस्त ; Pr. विट्ट (for विट्ठ, as पजट्ट for पजट्ठ, see No. 112) ; Pr. विट्टेइ or विट्टइ, H. बौटै.

136 den. बीत् *pass* = Skr. P. P. P. वीत, Pr. वित्त (like निच्छित्त for Skr. निच्छित, H. C. 2, 99; otherwise the preservation of त is not explicable); Pr. वित्तेइ or वित्तइ, H. बीतै.

137 den. बेढ् *enclose, surround* = Skr. वेष्ट्, Causal वेष्टयति or I. cl. वेष्टते, Pr. वेढेइ (H. C. 4, 51) or वेढइ (H. C. 4, 221), H. बेढै. The root is probably a denominative of an anomalous P. P. P. or some other derivative of the root विश् or विष्. The so-called Causal shows its denominative form.

138 den. बउराव् or बौराव् *go mad* = Skr. N. वातुल; Pr. वाउल्लावेइ or वाउल्लावइ, H. बउल्लावै or बौरावै. See my Comp. Gramm. § 25.

139 den. भाग *flee* = Skr. P. P. P. भग्न, Pr. भग्ग (cf. H. C. 4, 354), Pr. भग्गेइ or भग्गइ, H. भागै.

140 den. भीँग् or भीग् *be wet* = Skr. अभ्यक्त; Pr. अब्भिंगेइ, or अब्भिंगइ, H. भीँगै or भीगै (?). As to the loss of initial अ, see my Comp. Gramm. 172. Compare the primary root भीज् in the Appendix No. 21.

141 der. भुन् *be fried, be cooked,* a passive or intransitive, derived from भून् No. 143.

142 den. भूल् or भोल् or भोर् *forget, blunder* = Skr. P. P. P. भ्रष्ट; Pr. भुल्लइ (H. C. 4, 177), W. H. भूलै or भोलै, E. H. भूरै or भोरै. Skr. भ्रष्ट = Pr. भुट्ठ = भुल्ह = भुल्ल; the change of *a* to *u* caused by the labial *bh*. As to the change of *u* to *o*, see my Comp. Gramm. § 148.*

143 den. भून् *fry, cook* = Skr. P. P. P. भूर्ण (Pan 8, 2. 44); Pr. भुण्णेइ or भुण्णइ, H. भूनै.

144 den. मढ् *cover, gilt* (*i. e.* encase by rubbing on) = Skr. P. P. P. मृष्ट, Pr. मट्ठ or (disaspirated) मड्ड; Pr. मड्डइ or मढइ (H. C. 4, 126), H. मढै. The Skr. root मठ् *cover* is adopted from the primitive Prákrit or Páli मट्ठ (= मृष्ट), whence मठ *a covering, hut,* H. मढ़ or मढ़ा. Similarly are formed the roots कढ़्, बेढ़्, &c.

145 den. मत् *consult* = Skr. N. मन्त्र; Pr. मंतेइ or मंतइ (cf. H. C. 4, 260 मंतिदो), H. मतै (with elided nasal, see my Comp. Gramm. § 143).

146 der. मिट् *be effaced, cease to exist,* a passive or intransitive, derived from the root मेट्, No. 153.

147 der. मुंड् *be shaved,* a passive or intransitive, derived from the primary root मूँड, No. 284.

148 der. मुंद् *be closed,* a passive or intransitive, derived from the root मूँद्, No. 151.

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* This derivation I owe to S. Goldschmidt, *Prákritica,* No. 8, p. 9. Formerly, looking upon भोल् or भोर् as the more primitive form, I was inclined to consider it a denominative of Skr. भ्रमर, whence comes Hindí भोरा or भोला *a simpleton.*

149 den. मृ *die* = Skr. P. P. P. मृत, Pr. मुअ (H. C. 4, 442); Pr. मुअइ, H. मुए.

150 den. मूत् *discharge urine* = Skr. N. मूत्र; Skr. मूत्रयति, Pr. मुत्तेइ or मुत्तइ, H. मूतै.

151 den. मूँद् *close* (lit. with a seal ring) = Skr. N. मुद्रा; Skr. मुद्रयति, Pr. मुद्देइ or मुद्दइ, H. मूँदै. See H. C. 4, 401 दिण्णी मुद्द *sealed.*

152 den. मून् *be silent* = Skr. P. P. P. मून (of root मू); Pr. मूणेइ or मूणइ, H. मूनै, (or from N. मौन)

153 den. मेट् *efface* = Skr. P. P. P. मृष्ट, Pr. मिट्टेइ or मिट्टइ (disaspirated for मिट्ठइ, cf. Páli मट्ठ or मट्ट = मृष्ट), H. मेटै, (with *e* for *i*, see my Comp. Gramm. § 148).

154 den. मौल् or मौर् *blossom* = Skr. N. मौल; whence मौलयति, Pr. मोलेइ or मोलइ, W. H. मौलै or E. H. मौरै.

155 den. मौलाव् or मौराव् *blossom* = Skr. N. मौल; Pr. मोलावेइ or मोलावइ, W. H. मौलावै or E. H. मौरावै.

156 den. रग् *be attached* = Skr. P. P. P. रक्त, Pr. रग्ग (H. C. 2, 10); Pr. रग्गेइ or रग्गइ, H. रगै.

157 den. रंग् *dye* = Skr. N. रंग; Skr. रंगयति, Pr. रंगेइ or रंगइ, H. रंगै.

158 der. रुक् *be hindered,* a passive or intransitive, derived from root रोक्, No. 162.

159 der. रुध् or रुद् *be restrained*, a passive or intransitive, derived from the primary root रूँध् No. 298.

160 den. रूठ् or रूढ् *be angry* = Skr. P. P. P. रुष्ट, Pr. रुट्ठ (H. C. 4, 414) or रुड्ड, Pr. रुट्ठइ or रुड्डइ, H. रूठै or रूड़ै.

161 comp. रेँक *bray* = Skr. रेष् (acc. sg. neut. रेट्) + कृ; Pr. रेंकेइ or रेंकइ, H. रेँकै.

162 comp. रोक् *hinder* = Skr. रुध् (acc. sg. neut. रुत्) + कृ; Pr. रुक्केइ or रुक्कइ, H. रोकै.

163 der. रोप् *stop, plant;* a transitive or active, derived from primary root रुप्, No. 295

164 den. लंगड़् *limp* = Skr. N. लङ्ग, Pr. diminutive लंगड; Pr. लंगडेइ or लंगडइ, H. लंगड़ै.

165 den. लव् or लौ *reap* = Skr. N. लव; Skr. लवयति, Pr. लवेइ or लवइ, H. लवै or लौए.

166 comp. लुक् *disappear, conceal oneself* = लुप् + कृ; Pr. लुक्कइ (H. C. 4, 55), H. लुकै. The word लुप् properly means "dropping out", "elision"; it is derived from the Skr root लुप् *break.* This original meaning of the root is still preserved by the Pr. लुक्कइ, which means both *break, cut of,* (H. C. 4, 116, where it is said to be =

Skr. तुड्) and *disappear, conceal oneself* (H. C. 4, 56, where it is given as an equivalent of the Skr. निली) *

167 den. लुभाव् or लुहाव् *covet, be enamoured with* = Skr. N. लोभ; Pr. लोभावइ or लोहावइ, H. लुभावै or लुहावै, (with *u* for *o*, see my Comp Gramm. § 25).

168 der. सज् *be adorned, be prepared*, a passive or intransitive, derived from root साज्, see Appendix No. 24.

169 comp. सटक् or सड़क् *get away, disappear, conceal oneself* = Skr. सत्र or सद् + कृ; Pr. सट्टकइ or सडकइ, H. सटकै or सड़कै. The word सत्र means *covering, concealment*. The root सद् becomes सड् in Pr.; see Vr. 8, 51. H. C. 4, 219.

170 der. सध् *be settled*, a passive or intransitive, derived from the primary root साध् No. 336.

171 den. समुहाव् *be in presence of* = Skr. N. संमुख; Pr. संमुहावेइ or संमुहावइ, H. समुहावै.

172 comp. सरक् *be moved, move* = Skr. सर + कृ; Pr. सरक्केइ or सरकइ, H. सरकै. Possibly it is a mere variety of the root सड़क्.

173 den. सराप् *curse*, denom. made from the Hindí सराप a corruption of the Skr. शाप; see my Comp. Gramm. § 135.

174 der. साट or साँठ् or साँट् *combine*, a transitive or active, derived from the primary root संठ, No. 323.

175 den. सील् *moisten* = Skr. N. शीतल; Pr. सीअल्लेइ or सीअल्लइ, H सीलै. on the absorption of *a* after *í*, see my Comp. Gramm. § 97.

176 der. सुधर् *be correct, mend*, a passive or intransitive, derived from the primary root सुधार्, see No. 346.

177 den. सुहाव् *be pleased* or *give pleasure* = Skr. N. सुख; Pr. सुहावेइ or सुहावइ, H. सुहावै.

178 den. सुहाव् *be beautiful* or *make beautiful* = Skr. N. शोभ; Skr. शोभयति, Pr. सोहावेइ or सोहावइ, H. सुहावै. This might, however, be a primary root, from the causal of root शुभ्.

179 den. सूख् or सुख् *be dry* = Skr. N. शुष्क, Pr. सुक्खेइ or सुक्खइ, H. सूखै or सुखै.

180 den. सूत् *sleep* = Skr. P. P. P. सुप्त; Pr. सुत्तेइ or सुत्तइ, H. सूतै.

181 den. सैंत् or सेंत् *adjust* = Skr. P. P. P. समाहित, Pr. समाहित्त (cf. H. C. 2, 99 निहित्त = Skr. निहित), Ap. सवाँहित्त or सवाँहत्त, H. (contracted) सैंत; whence Pr. समाहित्तइ, H. सैंतै or सेंतै.

182 comp. छग् *evacuate* = Skr. छद् + कृ; Pr. छग्गइ, H. छगै (for छकै)?

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* The root लुक् might also be derived from लुच् + कृ, from the root लुंच् which (like लुप्) means both *cut off* and *disappear*. Or it might be derived from लुंब् + कृ; the root लुंब् meaning *become invisible*.

183 comp. हकाव् or हंकाव् *bawl, drive away* or *keep off* (with shouts) = Skr. हक् + कृ; Pr. हक्कावेइ or हक्कावइ, H. हकावै or हंकावै. This is a pleonastic form of No. 187.

184 den. हंकार् *bawl, drive away* or *keep off* (with shouts) = Skr. हक्कार; Skr. हक्कारयति, Pr. हक्कारेइ or हक्कारइ, H. हंकारै. Connected with roots Nos. 183 and 187.

185 हत् *slay* = Skr. P. P. P. हत, Pr. हत्त (like निहित्त H. C. 2, 99); Pr. हत्तेइ or हत्तइ, H. हतै.

186 comp. हलक् *move* = Skr. हल्ल + कृ; Pr. हलक्केइ or हलक्कइ, H. हलकै.

187 comp. हांक् *bawl, drive* (with shouts) = Skr. हक् + कृ; Pr. हक्केइ or हक्कइ (H. C. 4, 134), H. हांकै. See Nos. 183, 184. Probably connected with root भण् or भंज or भाष् *talk* + कृ.

188 den. हार् *lose, be beaten, be unsuccessful* = Skr. N. हार, Pr. हारेइ or हारइ, H. हारै. H. C. 4, 31 has हारवइ (for हारावइ by H. C. 3, 150), said to be = नश्यति; it is merely a pleonastic form of हारै. Hindí has हरावै or हिरावै.

189 comp. धोंक् *blow* = Skr. धम + कृ; Pr. धमक्केइ or धमक्कइ, Ap. धवँक्कइ, H. धोंकै (for धौंकै). See No. 92.

APPENDIX.—*Primary Roots.**

1 ऐंच् or एंच् *pull, attract* = Skr. आ + कृष्, future आकर्ष्यति (used in the sense of the present), Pr. आयंछइ or आइंछइ (H. C. 4, 187), H. ऐंचै or एंचै (with loss of aspiration). See introductory remarks, pp. 39, 40. This root occurs in the shortened form अंच् both in Pr. (H. C. 4, 187 अंचइ) and in old Hindí (Prithiraj Rasau 27, 38 अंचै); see No. 2.

2 खैंच् or खेंच् or खैच् or खेच् *pull* = Skr. कृष्, future कर्ष्यति (used in the sense of the present); Pr. कच्छइ or कंछइ, H. खैचै, खेचै or खैंचै, खेंचै (with transfer of aspiration, see my Comp. Gramm. 132). On the inserted nasal, see *ibidem* §§ 149, 158, H. C. 1, 26, 28. On the change of *a* to *ai* or *e*, see my Comp. Gramm. § 148; here it occurred by assimilation to root ऐंच् or एंच् No. 1. See introductory remarks pp. 39, 40. In old Hindí this root occurs in the form खंच्, which is much nearer the original Prákrit form कंछ्; and corresponding to it, the old Hindí has a root-form अंच् which has evidently been modified from the original form ऐंच् (see No. 1), in order to assimilate it to खंच्; just as the original form खंच् has

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* These are roots which I was at first inclined to consider to belong to the secondary class.

been modified to खैंच in order to assimilate it to ऐंच्. Thus the two forms खंचै and ऐंचै occur in the Prithiráj Rasau 27, 38.

षां मंगोल ललरी वीस टंकी वर षंचै ।
चौतेगौ सब्भाज बान अरि प्रान सु ऐंचै ॥ *i. e.*,

"The Mangol Khán Lalarí draws twenty daggers, and the four-sworded Sabbáj pulls out the enemy's life with his arrows."

3 छांड़् *vomit, let go, release* = Skr. छृद्, I. cl. छर्दति, Pr. छड्डइ (H. C. 4, 91), H. छांडै. The root is also spelled छांटै; and it might be derived from छृद्, VII. cl. छृणत्ति, Pr. छंडइ or छंटइ, H. छांडै or छांटै (as Pr. भंजइ for Skr. भनक्ति). It might also be derived from the Skr. denominative root छर्द्, X. cl. छर्दयति; as it seems to have been done in H. C. 2, 36 (छड्डइ from छर्दि).

4 छप् *be pressed down, be stamped, be printed* = Skr. चंप्, I. cl. चम्पति, Pr. छंपइ, H. छपै. Or perhaps from क्षम्, IV. cl. क्षाम्यति.*

5 झंख् or झख् or झक् *sigh, chatter* (wildly), *lament, be sorry for* = Skr. ध्वांक्ष्, I. cl. ध्वांक्षति, Pr. झंखइ (H. C. 4, 140), H. झंखै, झखै or (disaspirated) झकै. As to the change of ध्व to झ, compare Pr. झओ for Skr. ध्वजः (H. C. 2, 27). As to the meaning, compare the English "croak."†

6 झांप् *throw on, cover* = Skr. क्षप् *throw*, Passive क्षप्यते (used actively), Pr. झंपइ, H. झांपै. The झ for क्ष is as in झिज्जइ for क्षीयते H. C. 2, 3, and the inserted anusvára, as in जंपइ (H. C. 4, 2. 1, 26, for जप्पइ). Or it might be derived from Skr. अधि + ऋ, Causal अध्यर्पयति, Pr. झंपेइ or झंपइ (for अज्झंपइ, with loss of initial अ see my Comp. Gramm. § 172).

7 ठक् *knock, hammer* = Skr. तक्ष्, I. cl. तक्षति, Pr. टक्खइ (with ट for त as in टगरो H. C. 1, 205), H. ठकै (for टखै with transfer of aspiration). Compare Skr. टक्कर. See No. 9.

8 ठांस् *ram, hammer* = Skr. तक्ष्, I. cl. तक्षति, Pr. टच्छइ (as to ट for त, see H. C. 1, 205), H. ठांसै (for टछै, with transfer of aspiration from छ to ट, and change of छ to स्, see my Comp. Gramm. §§ 11, 132). See No. 10, also Nos. 7 and 9.

9 ठोक् or ठोंक् *ram, hammer, drive in,* (nail, &c.) = Skr. त्वक्ष्, I. cl. त्वक्षति, Pr. टुक्खइ (as to ट for त, see H. C. 1, 205), H. ठोकै or ठोंकै (for टोखै, with transferred aspiration). See No. 7.

10 ठोस् or ठोंस् *ram, hammer* = Skr. त्वक्ष्, I. cl. त्वक्षति, Pr. टुच्छइ (cf. H. C. 1, 205), H. ठोसै or ठोंसै (for टोछै). See No. 8.

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* The root क्षुभ् also might produce a Pr. passive (used actively) छप्पइ, analogous to छिप्पइ (H. C. 4, 257).

† This verb is noted by Hemachandra not less than five times; in 4, 140 as = संतप् *repent*, in 4, 148 = विलप् *lament* or *prattle*, in 4, 156 = उपालभ् *scold*, in 4, 201 = निःश्वस् *sigh*, and in 4, 259 = भाष् *talk*.

11 ढाल् or ढार् *send forth, pour out, cast*, a modification of धाड़्, No. 14 *q. v.*, cerebralisation transferred to the initial ध from ड़.

12 थप् *fix, settle* = Skr. स्तभ्; Passive स्तभ्यते (used actively), Pr. थप्पइ (formed similarly to छिप्पइ from स्पृश्यते H. C. 4, 257), H. थपै. See footnote on p. 46; भ्य = ब्य = प्य = प्प.

13 थाप् or ठप् *slap, strike, pat* = Skr. स्तृह्, Passive स्तृह्यते (used actively), Pr. थप्पइ or ठप्पइ, H. थापै or ठपै. See footnote on p. 46; ह्य = भ्य = ब्य = प्य = प्प.

14 धाड़् *send forth, pour out, cast* = Skr. भ्राड्, I. cl. भ्राडते, Pr. धाडइ (H. C. 4, 79), H. धाड़ै. See No. 11. The Skr. भ्राड् is adopted from the Pr., and is probably a denominative of भ्रष्ट, P. P. P. of भ्रज् *glide, flow*, Pr. धट्ठ = धड्ड = धाड.

15 फलंग् *leap* = Skr. प्र+लंघ्, I. cl. प्रलंघति, Pr. पलंघइ, H. फलंगै (with transfer of aspiration).

16 फेंक् or फौंक् *hurl, fling, throw away* = Skr. प्र-इष्, Future प्रेष्यति (used in sense of present), Pr. पेक्खइ or पेंखइ, H. फेंकै or फौंकै (with transfer of aspiration).

17 बिन् *weave* = Skr. वृ, IX. cl. वृणाति, Pr. विणइ, H. बिनै; see No. 19; also No. I, 237. The Skr. root for *weave* is वे, I. cl. वयति or IV. cl. ऊयते; it seems impossible to derive the H. root बिन् from it; but the roots वृ and वे are probably connected; both mean *cover*.

18 बिछ् *be spread* = Skr. वि-स्तॄ, Passive विस्त्रियते (for विस्तीर्यते; like क्रियते, म्रियते), Pr. विच्छेइ or विच्छइ, H. बिछै. Compare Pr. विच्छिण्णं in Chaṇḍa 2, 21 for Skr. विस्तीर्णं.

19 बुन् *weave* = Skr. वृ, V. cl. वृणोति, Pr. वुणइ, H. बुनै, formed like सुन् No. I, 347. See No. 17.

20 बोझ् *load* = Skr. वह्, Passive उह्यते (used actively) or Causal Passive वाह्यते, Pr. वुज्झइ (cf. H. C. 4, 245 वुब्भइ), H. बोझै.

21 भीज् or भींज् *be wet* = Skr. अभि + अंज्, Passive अभ्यज्यते, Pr. अब्भिज्जइ, H. भीजै or भींजै (with loss of initial अ; see secondary root भीग् No. 140).

22 भूंक or भोंक् or भौंक् *talk foolishly, bark* = Skr. भष्, Future भक्ष्यति. Pr. भुक्कइ (H. C. 4, 186, with disaspiration for भुक्खइ), H. भूंकै, &c. The original aspirate form भोखै occurs in Hindí. There is an identically spelled root, meaning *thrust, drive*, which probably has a different origin and may be a compound root.

23 भेज् *send* = Skr. अभि + अज्, Passive अभ्यज्यते (used actively), Pr. अब्भिज्जइ, H. भेजै (with loss of initial अ and change of *i* to *e*, see my Comp. Gramm. §§ 172, 148. As to the change of *ya* to *i*, see *ibidem*, § 121.

24 साज् *adorn, prepare* = Skr. सज्ज्, Passive सज्यते (used actively), Pr. सज्जइ, H. साजै. The Skr. root सज्ज् has been adopted from the Prákrit.

ABBREVIATIONS.

Bs. = Beames' *Comparative Grammar.*
Cw. = Cowell's edition of the *Prákrita Prakáṣa.*
Dl. = Delius' *Radices Pracriticæ.*
E. M. = E. Müller's *Beiträge zur Grammatik des Jainaprákrit.*
H. C. = Hema Chandra's *Prákrit Grammatik* (ed. Pischel).
K. I. = Kramad Iṣvara's *Prákrit Grammar.*
R. M. = Dr. Rajendralala Mitra's *Prákrit Vocabulary.*
S. B. = Setubandha (ed. S. Goldschmidt).
S. C. = Ṣubha Chandra's *Prákrit Grammar.*
S. Gdt. = S. Goldschmidt's edition of the *Setubandha.*
Spt. = Saptaṣataka des Hála (ed. A. Weber).
T. V. = Trivikrama's *Prákrit Grammar.*
Vr. = Vararuchi's *Prákrit Grammar.*
Wb. = Weber's edition of the *Saptaṣataka.*

G. = Gujarátí. S. = Sindhí.
M. = Maráṭhí.

Coins supplementary to Thomas' Chronicles of the Pathan kings.—By

C. J. RODGERS.

(With two Plates.)

The "Chronicles of the Pathan kings" is a very full work. But it is an enlargement of a smaller previous work. Further search brought more coins to light, and the description of these coins has swollen the original treatise to its present size. But large though the work be, it is not *exhaustive.* Finality in our knowledge of the coins of the Pathans has not yet been attained. Continued search will bring out still further coins which from time to time will have to be described. Owing to the nature of my duties I have few opportunities of obtaining fresh coins, but as I have during the past year come across about forty unpublished ones, I thought I might venture to put them forward as a small contribution to a further knowledge of the coins of India.

The word *a'dl* figures largely on the coins of the Gazní rulers. In some modern coins this word occurs together with the sword on several coins of towns in Afghanistan. It must have been for the reason, that might is right, that the early conquerors of India stuck this word on their coins. In Plate V, Nos. 1 and 2 have *a'dl* on the obverse and *mumalliki* on the reverse. I am inclined to ascribe this coin to *Muhammad Sám* or his general *Eibek.* The word I have transliterated as *mumalliki* may be *mumlakat.* No. 6 I regard as a coin of Muizz-ud-dín Muhammad Sám. The word Muizz on this coin is written more like the same word on the coins of Eldoz and of Muhammad Sám, than that on the coins of Muizz-ud-dín Kaikubad or Muizz-ud-dín Bahram Sháh. There is a coin in the "*Ariana Antiqua,*" Pl. XX. fig. 14 which is not mentioned by Thomas. Now I got a good specimen of this same coin from Neshápúr with a lot of the coins of A'la-ud-dín Khwárizmí. A glance at No. 15

of Plate V, will show that this very king A'la-ud-dín struck coins of the very same type, using the square area for his name and titles and dividing the latter similarly to Muizz-ud-dín. No. 7, Pl. V, I claim also for Muhammad Sám. It has Muizzí on obverse and on reverse in Hindí, Srí Samanta Deva.

Nos. 3 and 4, Pl. V, are undoubtedly new types of Shams-ud-dín Altamsh. No. 3 has obv. *a'dl*, rev. *Shamsí.* No. 4 has the same with a star underneath each word. Neither has any ornament.

No. 9 is, I believe, also Shams-ud-dín's. The star seems to indicate this. *A'dl i Sultan ul Muazzim*, the inscription on the obverse is found also on a large quantity of coins of size similar to this one of which Thomas takes no notice. But the *Zarb ba Lahore* with star above it is not on them. They have always *Zarb ba hazrat Dehli.* No. 9 is to me unique. But the other kind I mention are very common indeed. In my own small collection I have no less than 12 duplicates. One of them has *A'dl i Sultán i Muazzim ;* the *alif* and *lám* are altogether missing.

No. 10 is undoubtedly Shams-ud-dín's coin. *Obverse : A'dl us Sultán (ul A'zim) ; Reverse :* (*Sha*)*ms ud Dunya* (*wa*) *ud dín.* This is a very coarse coin.

Nos. 11, 12 and 13 are I think Shams-ud-dín's. The obverse and reverse are simple *A'dl* and *Dehli.* No. 11 has these words in square areas ; No. 12 in round ones with ornaments ; No. 13 in a hexagonal star, with dots in the angles.

No. 5 is a very rare coin weighing only the same as No. 109 in Thomas, and half the weight of his No. 52, the inscriptions of which latter coin it possesses. So we may regard this coin as the smallest hitherto discovered of Shams-ud-dín's. It is exceedingly rare as is the one double its size. Thus in all I have had the pleasure of unearthing no less than 10 new types of coins of Shams-ud-dín.

No. 8 I ascribe to *Reziah.* In the rayed circle is the name *Reziah.* On the reverse is the *bull* with Samanta Deva above it in Hindí. The whole coin is similar to No. 7 of the same plate.

No. 14, Plate V is evidently a coin of the same king the No. 15 belongs to. And No. 15 is obv. *A'la ud Dunya*, rev. Wa ud dín. This is a coin of A'la ud dín Khwarizmí. No. 14 has similar inscriptions to those on No. 5 ; but the fortunate discovery of No. 15 settles the ascription.

No. 16 is a new coin of the same king. In the central area is the word *Sultán* and on the margin *Ul A'zim A'la ud Dunya wa ud dín Muhammad* (*bin us Sul*)*tán.* Reverse : the Kalimah. The whole is in Kufic characters.

Not one of these three coins is in the British Museum or is noticed by Thomas.

No. 17 is a coin of Fíroz Sháh Zafar, son of Fíroz Sháh. The obverse has on it in square area Fíroz Sháh. The margin reads *Zafar ibn Fíroz Sháh Sultán*, the reverse has *náib i amir ul Mominín* 791. No. 18 is exactly the same in date and inscriptions, but the latter are arranged differently on the obverse. *Zafar* beginning above the area and not on the left hand side as in No. 17. They are both of silver and copper. This Zafar Khán, son of Fíroz Sháh, died in Gujrát in 775, A. H. But he had a son also named Zafar Khan, and this coin may have been struck in his honour after the death of Fíroz Sháh.

No. 19 is a coin of Muhammad Shah, son of Fíroz Sháh. It is not in Thomas in this size. This coin is very light. In reading the margin of the large coin of this type, Thomas omits the word *Sultán* which is always on the best preserved specimens. The centre area is *Muhammad Shah*. The margin reads from the outside and is *Sultán, zarb bahazrat i Dehli*. The reverse of this coin is Naib i Amír ul Mominín 792.

No. 19*a* is a coin of similar type without any date on the reverse. Inasmuch as the margin of this coin reads from the inside, I am inclined to ascribe this to Muhammad bin Faríd Sháh, whose coins, when similar in type to the coins of the son of Fíroz, have always some difference in the arrangement of the words.

No. 20 is a coin of Muhammad Sháh son of Faríd Sháh. The inscriptions are, obverse *Sultán Muhammad Sháh, Faríd Sháh zarb Dehli*. Reverse *Khalifah Amír ul Mominín Khallad Khiláfotahu*. There is no date. There is some uncertainty as to the date of the death of this king. Thomas, quoting *Badaoní*, gives his death as 847. I got a coin of this king's during the time this plate was being prepared, dated 848. But this does not prove much; for from the time of Fíroz Sháh, the mints kept on coining in the names of kings who had been long dead; *e. g.*, Mubárak Sháh died in 837. And I have coins bearing the date of 840 and 854. A whole series of posthumous coins of these kings might easily be made.

No. 21 is a coin of Bahlol Sháh. The inscriptions are, substituting *Bahlol Sháh* for Muhammad Sháh, similar to those on the last coin. Coins bearing these inscriptions are somewhat rare in the smaller size. This large-sized coin is to me unique, and it has not as yet been published. This is the third new type of Bohlol's that I have brought to light.

No. 22 has no business in this plate. It was put in to fill up a gap, and because I saw that the coin is new to numismatists, as it is not in the British Museum Catalogue or in Thomas' work on the Gazní coins. It is a binominal coin, struck evidently by Bahrám Sháh. Obverse :—*A'dl us Sultán ul Azim Bahrám Sháh*. Reverse :—*A'zd us Sultán ul Muazzim Sanjar*. Here Bahrám seems to arrogate to himself the title of *A'zim* "the greatest" and to give his ally (A'zd) Sanjar who had helped him to retain his throne only the title *Muazzim* "the great," or "great," simply. Grammatically there is an apparent slight, but conventionally the title of Sanjar is as honorable as that of Bahrám. There is a difference, we know, for Muizz ud dín Muhammad bin Sám during the lifetime of his elder brother Gyás ud dín Muhammad bin Sám always used in his coins *Muazzim* for himself, until his brother's death when he took the title *ul A'zim.* But as I have shown above, Shams ud dín used the title *Muazzim*, as did also *A'la ud dín Masaud;* for I have two unedited small coins of his. Some two months ago I came across a find of Gazni coins in the Umritsur bazaar. There were about 500 in all. They contained several new types of Masaud III, Malik Arslán and Bahrám Sháh. The present war should cause some thousands to be unearthed and we may expect novelties for some time to come.

I now proceed to examine the coins in Plate VI. The first one is a small *Kashmiri* coin with the date (8)74 on it. It is a coin of Haider Sháh and confirms my statement in my paper on the Kashmir Sultans, that this king was reigning at that time, although his accession is usually marked in 878.

Nos. 2 and 3 are very pretty little novelties, of Muhammad Sháh and Sikandar Sháh. They are of copper. Obverse:—names of kings. Reverse:—the title *Sháh.* They are much smaller than Gyas ud dín's coins with similar inscriptions. They were evidently a revival of the small coins of Shams ud dín and Nasir ud dín Mahmúd and Muizz ud dín.

Nos. 4 and 5 are two anonymous coins of Humáyún, bearing the date 946. No. 4 was struck at Agra.

No. 7 a rupee, full sized, of Humáyún's, struck after his return in 962. It resembles very closely, in its get up, the rupees of Muhammad Súr. As yet all the silver coins of Humáyún which have been described have been thin and light, after the fashion of the *tankahs* of Central Asia. The inscriptions are very distinct. Obverse Area:—*Muhammad Humáyún. Bádsháh Gází* 962. Margin:—*Us Sultán ul A'dil Abú ul Muzaffar, Zarb (Dehli?).* Reverse Area:—*the Kalimah.* Margin;—names and titles of the four companions of Muhammad.

No. 8 is a rupee of Muhammad Sháh of Bengal. Obverse Area:—*Muhammad Shah Sultan Gází, Khallad allah mulkahu wa Sultanahu;* margin:—*Shams ud Dunya wa ud dín abu ul Muzaffar, Zarb, Satgáon.* Reverse Area:—*the Kalimah*, with a star; margin:—the names of the four companions and their titles together with the date 962. There is a difference between the titles of Umr in the above two rupees. In Humáyún's it is Al Fárúq, in the Bengal one *al Khattáb.*

No. 9, a new type of Baber's silver coins. It is of the tankah kind, but of uniform thickness and well struck, unlike most of the coins of

Baber. Obverse :—*Zahír ud dín Muhammad Bábar, Bádsháh Ghází* (9)37. *Khallad allah mulkahu wa Sultánahu, zarb Agrah.* (The bars and knots are not peculiar to the Kashmir coinage. They are found on the anonymous coins of both Baber and Humáyún). Reverse Area :—*the Kalimah ;* Margin :—names and titles of the four Companions.

Nos 10, 11, 12, are three varieties of a new type of Humáyún's anonymous coinage. They were all struck at *Champánír.* Firishtah spells this word جانپانیر. The coins all agree in giving it حسانیر. The inscriptions of these coins give a new feature—a title to a city. Champánír is entitled the noble city *Shahr i Mukarram.* It speaks well for Humáyún's nature that he could so style a city he had just conquered ; for the date of the coins is that of the conquest of the city 942. These coins too introduce a second new feature in Humáyún's anonymous coinage. Instead of *Fí ut táríkh,* they have *ba tárikh.* Obverse :—*Zarb Shahr i Mukarram.* Reverse :—*Champánír ba tárikh* 942. No. 11 belongs to Dav. Ross, Esq.

No. 13 is another of the anonymous coins of either Baber or Humáyún. I give it for two reasons : (1) It has full inscriptions. (2) The bar running across the Jaunpur anonymous coins resolves itself into a word *Mutabarrak*, the title of the city—*the Blessed.* Obverse, *Ba Dár ul zarb Khitta i Jaunpúr Mutabarrak.* Reverse :—*Fí ut tárikh san* 937 ; ornaments at the top and bottom. Most of the coins of Jaunpúr have a star on the obverse of one kind or other. But all have the bar, with the first letter and last one missing. All I have, have *dar ul zarb* on them too, although this is omitted by Thomas. The bars on some of the other anonymous coins may by the discovery of fuller specimens turn out to be some words or other.

Nos. 14, 15, 16, 17 and 18 are small copper coins of the Súrí family, forming of themselves a little set, out of which only one, No. 17, has been noticed by Thomas. No. 15 is the first of the set. Obverse :—*Khalífah uz Zamán* 947. Reverse :—*Sher Sháh us Sultán.* This is a very small coin indeed for Sher Sháh.

No. 16 is also Sher Sháh's, but it is larger and heavier than 15 and has a different inscription. Obverse :—*Sultán Khalífah uz zamán,* Reverse :—*Sher Sháh ul A'dil Sultán.*

No. 17 is Islám Sháh's, noticed by Thomas, No. 364, p. 413. I have given it here to complete the set at one view. No. 18 is Muhammad Sháh's Súrí. Obverse :—*Sultán Muhammad A'dil Sháh :* Reverse :—*Khalífah uz zamán Abú (ul Muzaffar).*

No. 14 is Sikundar Súrí's. Obverse :—*Khalífah uz zamán* 962. Reverse : *Sikandar Sháh us Sultán* 962. Thomas does not notice any *halves* of the large copper coins of any of the five Súrí kings. Halves of Sher Sháh are common, those of Islám Sháh are rare, those of Muhammad Ádil

Sháh are extremely rare, while I have only seen one of Ibrahím Sháh and not one of Sikandar Sháh's. General Cunningham had a large copper one of Sikandar Sháh. Mr. Delmerick published one of Ibrahím's. The large coins of the other three are common, the greater numbers of course being Sher Sháh's and Islám's. I have not as yet come across a small coin of Ibrahím's. This is one of the things I am looking for. The Sikandar Sháh, whose coin is given in this plate No. 2, I believe to be the one who reigned in 795 for 45 days. A comparison of this coin with No. 275, p. 311 of Thomas, of which I have a most perfect specimen, leads me to this conclusion. Now if a king who reigned only 45 days could in that short time get out no less than *five* kinds of coins, I think we have a right to look out for the same number of varieties in the coins of kings who reigned longer. Scientific and systematic search with duly chronicled results ought to lead to much fuller knowledge respecting the coins of the Patháns and their successors, and indeed with respect to the whole of the coins of the Empire of India from the time of Alexander the Great and Chandra Gupta to the times of Her Most Gracious Majesty the Empress of India and Queen of England.

As old coins are found, they find their way into the bazaars, where, if there is no purchaser at other than bullion rates, they are ruthlessly melted down, the silver being good, in order to supply metal to the makers of jewels. In this way undoubtedly thousands of coins disappear annually of which our museums and cabinets are standing in need. Meanwhile inasmuch as no Indian museum has its coins catalogued, no one knows what any collection may contain or may be in need of. Collectors would undoubtedly often present coins to museums which want them, if these wants were known. Students cannot use our Indian museums profitably until they know what the museums contain: and yet the end and object of all museums is an educational one. Hence I cannot help bringing this matter forward as one of the greatest importance in making our museums more useful in the promotion of historical studies.

Several other new varieties of coins including a rupee of Shams ud din Altamsh, a tankah of silver of the same king with *rays* round one side to represent *the sun* (Shams), a new variety of Reziah's and one of Kutub ud dín Mubárak Sháh's together with several others must stand over to a future paper, in which I hope to be able to show that No. 158, p. 190 of Thomas was struck in *Talang* (Telingana), just the same as No. 11 of Plate IV of the Society's Journal of last year.

Memorandum on Coins of the Sunga Dynasty.—*By* H. RIVETT-CARNAC, ESQ., C. S., C. I. E., F. S. A.

(With three Plates.)

I have to offer a few remarks on some more coins of the Sunga Dynasty submitted for the inspection of the Society.

Plate VII, No. 1 is a coin of quite a different type from those already sent. Mr. Carlleyle reads the inscription on it as *Ramadata.*

No. 2, A and B are 2 small coins with the legend *Achya* or *Bhanya.* (Mr. Carlleyle.) On the other side is what looks like the Buddhist wheel.

No. 3. The legend on this coin of *Bhanu Mitra* corresponds with that on the large coins already submitted to the Society and described by Mr. Carlleyle. The shape of the coin is, however, different, and a figure which Mr. Carlleyle takes for the Nirvána has been stamped in above the legend. There may, however, perhaps be some doubt whether this is intended for a recumbent figure of Buddha. It looks indeed more like a standing female figure on a low platform, a figure somewhat resembling that on the coin of Phaguni Mitra to be noticed later.

No. 4 is a similar coin. The legend not being in quite such good preservation.

No. 5 is a coin of *Agi* or *Agni Mitra* of the same type. In this specimen, however, the figure would seem to be that of a female, the bosoms being distinctly shewn. It is not unlike the rough representation on the Kannauj series of coins, see Plate XXIV, Vol. I, Prinsep.

No. 6, A, B, C are 3 small coins of the same type. The figures are distinct enough, but the inscription in each case is undecipherable.*

I have already sent to the Society, in illustration of Mr. Carlleyle's paper, specimens of each of the various coins of the Sunga Dynasty. The specimens sent were specially selected on account of the legend and the marks stamped on the obverse. The design on the reverse is hardly of so much importance, but it may be interesting to notice the Monogram or device chosen by each king. From a large number of specimens I have selected those now sent to illustrate as far as possible these points. Unfortunately none of the specimens are in very good preservation. The coins when found looked most hopeless. (See No. 7 specimen in its original condition now sent.) But by a careful process of boiling and cleaning the legends and stamps on the reverse have been rendered sufficiently clear.

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* [They are probably coins of *Súrya Mitra.* On No. 6 B, the letters *s*, *y*, *m*, and on No. 6 A, the letter *s* can be distinguished. ED.]

It is a curious fact that in hardly any case has it been possible to preserve the design on the reverse. Under the process of cleaning, what I may call the back of the coin has almost invariably flaked away. And this will hardly be wondered at when the condition in which the coins were originally found is seen.

The devices of the different monarchs may be noticed as follows:

Bhumi Mitra. The coins of this king, besides being very numerous, are nearly all in fairly good preservation. The device on the reverse is distinct. A standing figure on a platform, between two poles or pillars of victory, or whatever they may be called, each staff surmounted by three cross-bars, and the head surrounded by rays or flames. In the specimen No. 8 the figure holds what looks like a snake in its hand. The snake or line is not so distinct in all the coins (see Nos. 9, 10).

Agi or *Agni Mitra.* The coins numbered Nos. 11, 12 in Plate VIII bear nearly the same device as those of *Bhumi Mitra.* And of this king also it is to be noticed, that the coins, besides being numerous, are, comparatively speaking, in excellent preservation. Here also is a figure with rays or flames issuing from the head. This figure also stands on a platform between poles or staffs of victory. But in this case each staff is surmounted by what looks like a thistle or a *ghaṛa*, whereas in *Bhumi Mitra's* coins at the summit of each staff are, as already noticed, three cross-bars. The smaller of *Agni Mitra*, Nos. 13, 14, 15, exhibit a different device. The standing figure has in its hand what would seem to be a snake. There are no square platform and no side poles. At the base are rays or flames.* In fact the device is nearly the same as that on the coins of *Phaguni Mitra* now to be noticed.

Phaguni Mitra, Nos. 16, 17, 18, 19. These coins also are numerous and fairly well preserved. The device shews a standing female figure surrounded by what look like rays or flames.* In the right hand is a club (?), lower down and also on the right side a device or monogram is clearly distinguishable.

The coins of *Bhadraghoṣa*, *Surya Mitra* and *Bhanu Mitra*, which, together with *Phaguni Mitra*, are, I understand, not only new coins, but also record the names of kings hitherto unknown, are much less numerous than those first noticed and are not generally in such a good state of preservation as those of *Bhumi*, *Agni* and *Phaguni.* Those of *Bhadraghosa* indeed are in most cases scarcely legible. And had it not been for the beautiful little specimen which came into my hands before the find in Bareilly, there might have been some difficulty at first in establishing the legend on these coins. Not one single specimen shows, with any distinctness, the design on the reverse. Two of the best in this respect that I have, are marked Nos. 20, 21. On these a female figure, resembling that on the coins of *Phaguni Mitra* can just be made out.

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* [The base rather resembles the lotus-seat on the reverse of some Gupta coins. Ed.]

Bhanu Mitra. The device on Nos. 22, 23 is tolerably clear. The sun with pointed rays surmounts a semicircle which may be intended to represent a serpent. Below is what may be taken for a squat figure supporting the sun (?) but the device is perhaps hardly sufficiently distinct to admit of any very satisfactory conclusion being drawn. This may possibly be aided by coins of other types in the possession of the Society or figured in books which are not at my disposal.

Surya Mitra, Nos. 24, 25. Here, as the name denotes, is the sun surmounting what would seem to be a triangular-shaped altar with the staff of victory on either side. Here also the staff has the cross-bars as in *Bhumi Mitra's* coins.

To these I have added a coin of *Indra Mitra*, No. 26, similar to those already sent. This coin has I believe been found before. The device on the reverse is somewhat different from those already noticed, and shows a standing figure on a square platform, like that on the coins of *Bhumi* and *Agni Mitra*. In the right hand of the figure is a sceptre ? The Staff of Victory noticed in the other coins is wanting here.

It will be seen that of the seven kings whose coins are noticed above, six of them adopted a different device. As regards the coins of *Bhadraghosa*, it is not possible to speak with certainty. It will be noticed too that these six *Mitras* have all included the sun, or the rays of the sun on their coins, suggesting possibly their *Mitra* or *Mithraic* origin. The symbols on the obverse of the coins have been described by Mr. Carlleyle, and in all cases the design is the same or nearly the same. There is little or no difference in the shape of the letters used. The legend is surmounted by three symbols which are in all cases the same, although in the coins of *Bhadraghosa* and *Bhanu Mitra* the central symbol appears to have been punched in separately. All this would seem to suggest that these seven kings belong to the same dynasty. Mr. Carlleyle has attributed them to the Sunga kings, who, according to Prinsep and other authorities, commenced to reign over Magadha about 172 B. C.

I shall be glad if the Society can afford me any information regarding these kings—the succession in which they reigned and the probable dates of the coins.

In Prinsep's list *Agni Mitra* appears next after *Pushpa Mitra* the first of the line. And this arrangement coincides with that given by Wilford and others in the Asiatic Researches. If the condition of the coin and the quantity in which it is found are of any significance, then *Agni*

Mitra might fairly be supposed to be one of the most recent of these kings.

I have no suggestions to offer regarding any of them, save *Bhadraghosa.* It will be seen from Prinsep's list and also from Wilford's Essay in Asiatic Researches, Vol. XI, that one *Ghosa Vasu* preceded *Vajra Mitra.* Regarding this *Vajra Mitra,* Wilford in his Essay on Vikramaditya and Salivahana (see Asiatic Researches, Vol. IX, page 145,) writes as follows: "The first Vicramáditya is mentioned in the Cumáricá-c'handa; in which it is declared that after 3020 years of the Cali-yuga had elapsed, then would Vicramárca appear. He reigned fourteen years, and of course died in the year 3034, when the era of Yudhishtir ended and his own began. In the list of the kings, who were to appear in the Cali-yuga, to be found in the Bhágavata, Brahmánda, Váyu and Vishnu Puránas, there are two kings, the seventeenth and eighteenth in regular succession from Chandragupta, who reigned seven years each. The first is called *Vicrama,* and the other *Mitra;* and they are supposed to have been originally meant for *Vicrama mitra* who, according to some, reigned fourteen years; and in these lists, the father, or predecessor of Vicrama, is called *Ghosha Rája* or the king of thickets, which is another name for Gandharupa, or Gadhá-rája in the west. This looks like an interpolation; and the more so, as it will appear hereafter, that Ghosha-Rája died in the year 440 of our Era."

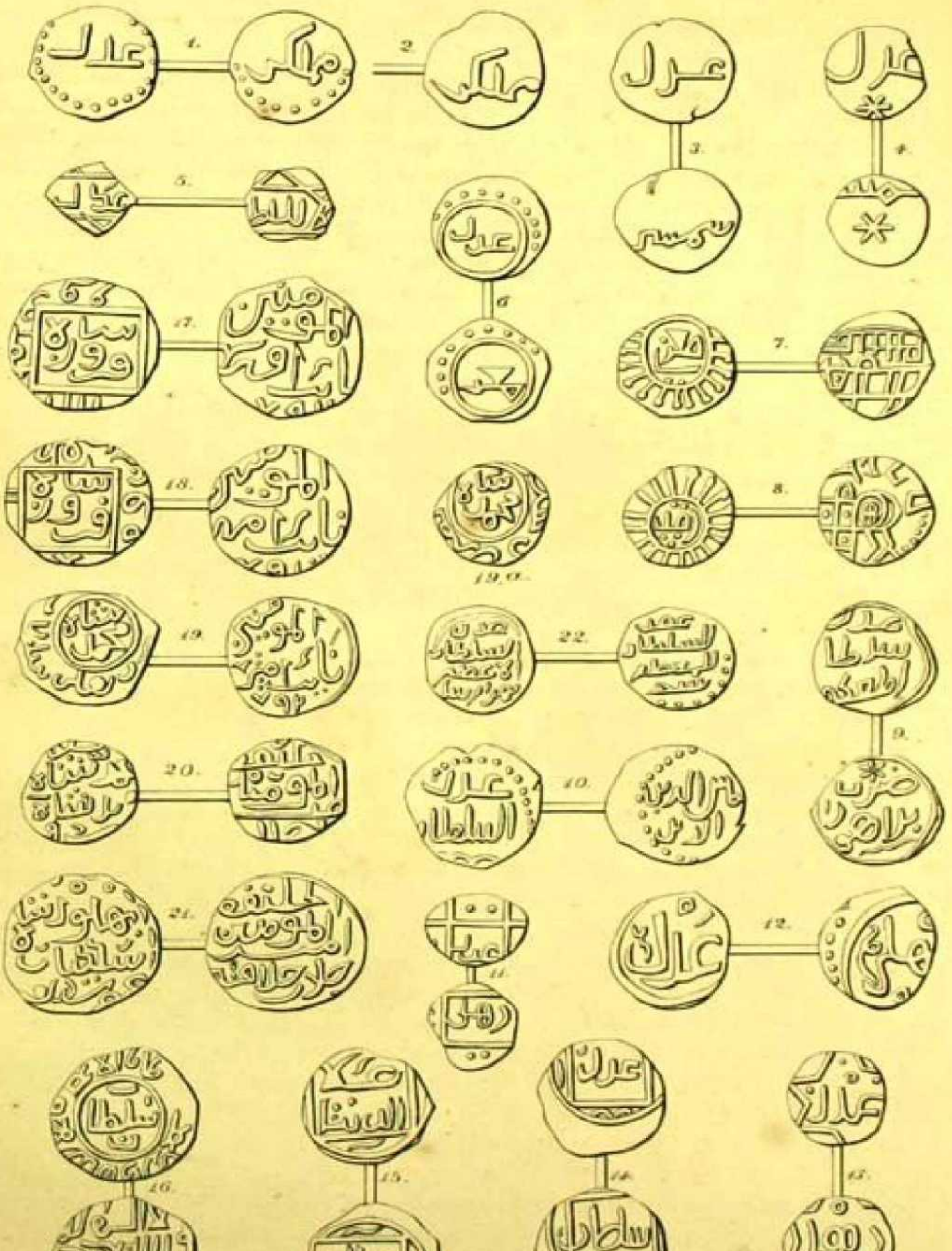
The Vajra Mitra of Prinsep's list is here supposed to be Vikrama Mitra or Vikramáditya, whose father and predecessor is Ghosa Rája. Wilford thinks that this name Ghosa looks like an interpolation. But perhaps the discovery of a coin belonging to this period, bearing the name of Ghosa, may help to establish the correctness of the entry?

It is perhaps also worthy of notice that Prinsep's list of the Kanwa Dynasty gives the name *Bhumi Mitra,* a contemporary of Vikramáditya. The coins of *Bhumi Mitra* and *Bhadraghosa* are certainly of about the same period, and possibly of the same dynasty. I am aware that since Wilford and Prinsep wrote, Mr. Thomas, General Cunningham and others have done much to clear up the doubts existing in respect to early Hindú Chronology. I am in hopes that those who are better informed than myself on the subject may be able to draw some practical conclusion from the coins which I have been able to collect.

I may add that the mass of them have now been tolerably well cleaned. They have been carefully examined and read by Mr. Carlleyle and myself, but no new types save those sent to the Society have been found. They are entirely at the disposal of the Society if they wish to see them, and I hope that a complete set may be accepted for the Society's Museum. The only reservation I have to make is, that a complete selection of the best specimens should be reserved for the British Museum, which Institution ought, I think, to have the first choice.

Journal. As. Soc. Bengal. Vol. XLIX. Pt. I. 1880.

Pl. V.



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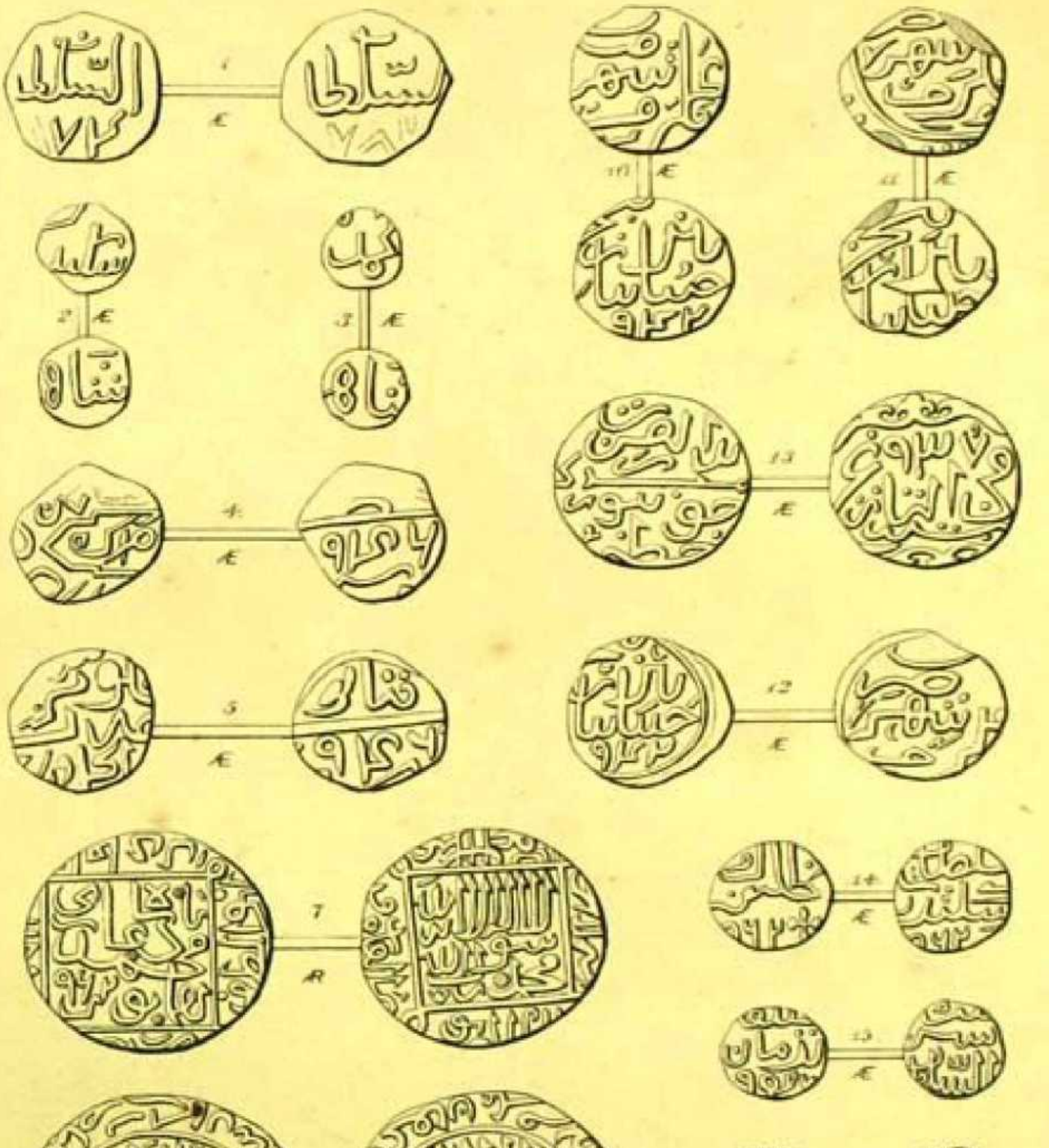

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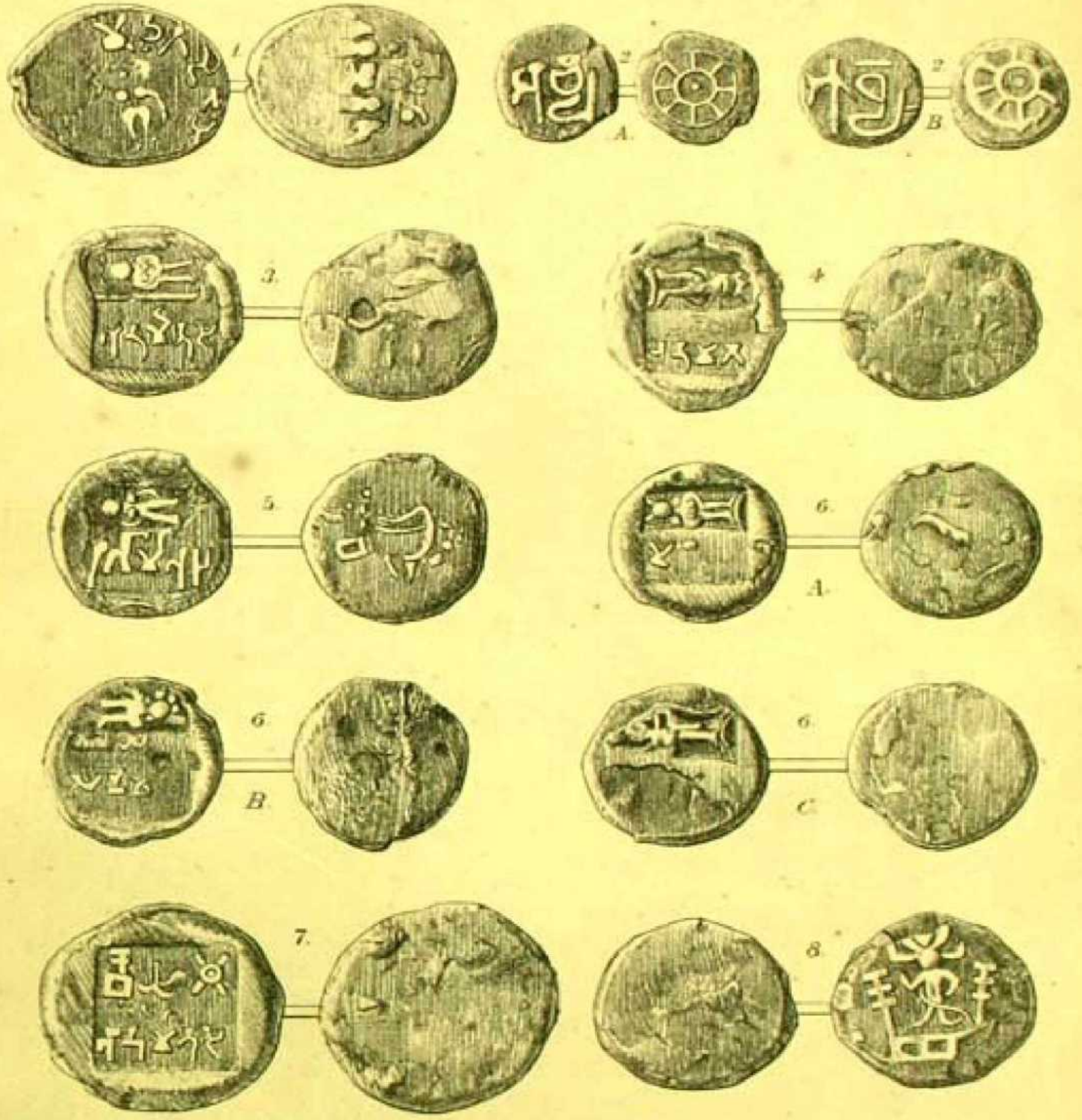

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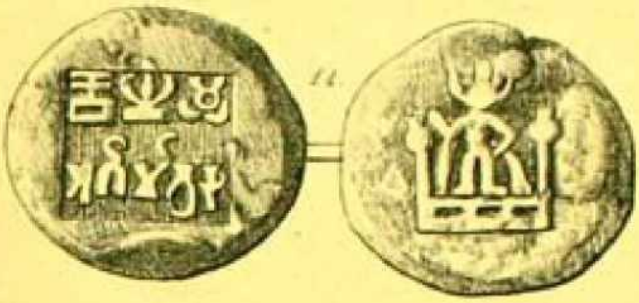
COINS OF THE MITRA OR SUNGA DYNASTY.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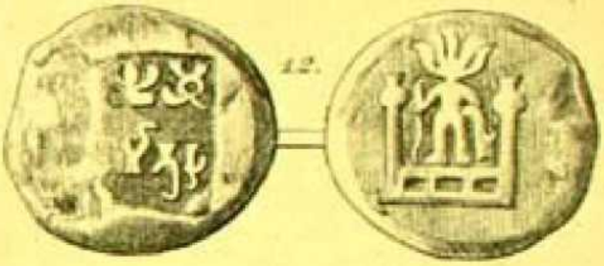
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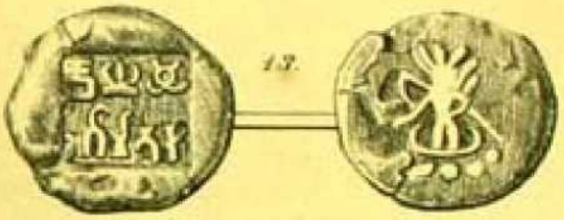
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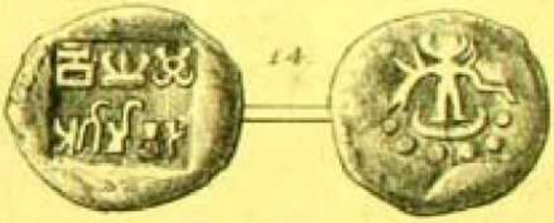
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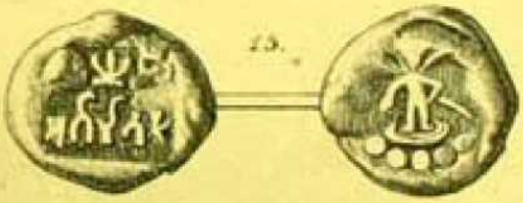
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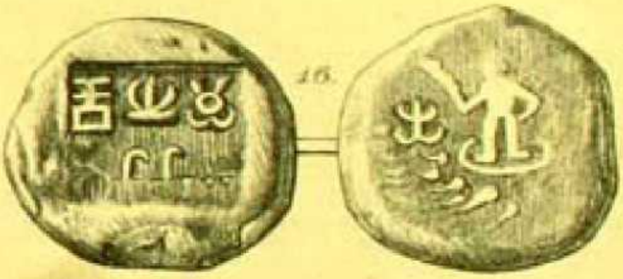
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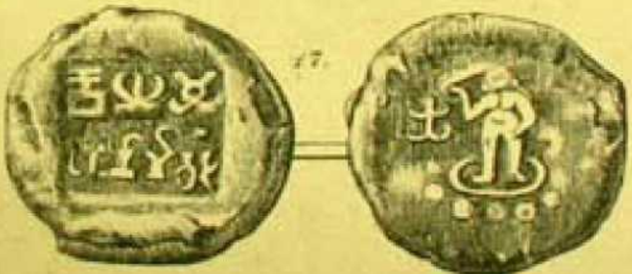
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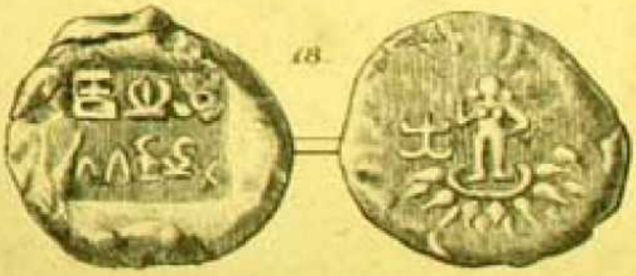
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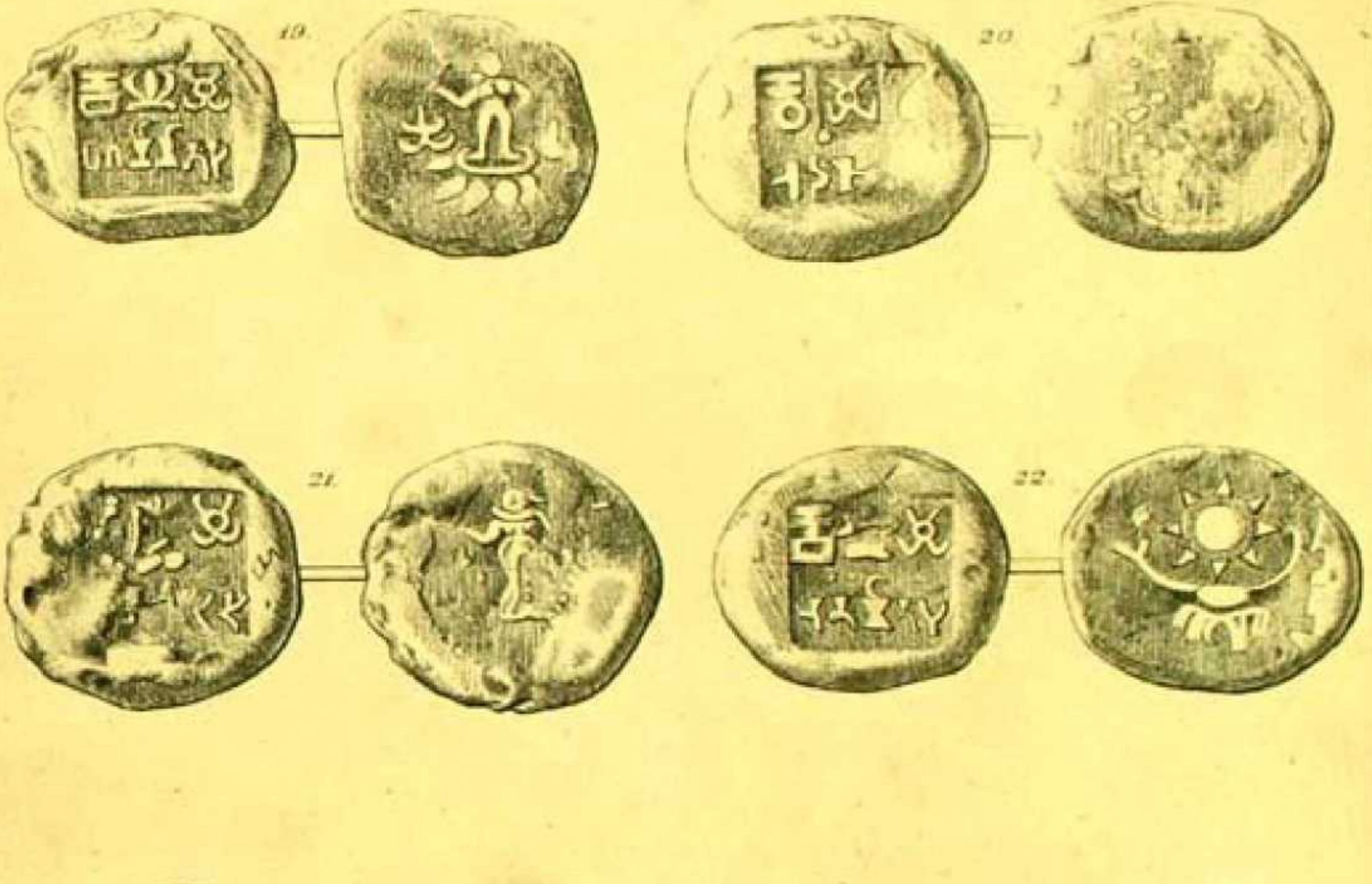
COINS OF THE MITRA OR SUNGA DYNASTY.



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COINS OF THE MITRA OR SUNGA DYNASTY.

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL,

Part I.—HISTORY, LITERATURE, &c.

No. III.—1880.

Remarks of the Afgháns found along the Route of the Tal Chotiali Field Force, in the Spring of 1879.—*By* Lieut. R. C. Temple, B. S. C., F. R. G. S., M. R. A. S., &c. (With 3 Plates and 2 Maps.)

Part I.

This is the last of a series of papers on the march of the Tal Chotiali Field Force in the spring of last year, and closes my observations on the subject.* As the range of observations to be made along an entirely new and unknown route such as this is necessarily large, I found it impracticable to connect them all into one paper, and this has obliged me to repeat in the several papers certain remarks which were necessary to the exposition of the subject-matter of each, and I trust therefore to be excused for repeating here much that is to be found elsewhere. I have also again to make the excuse to be found in all my papers on this subject that my notes were from the nature of the circumstances under which they were made necessarily of a rough and hurried kind and contain doubtless many mistakes, but as it seems the route is to be abandoned, it is likely to be a long while before it is again traversed throughout, and I hope therefore my notes will be found to be of value.

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* Journal of the march of the 2nd Column of the Tal Chotiali Field Force communicated to the Quarter Master General in India.

An account of the march of the 2nd Column Tal Chotiali Fieid Force, to the R. G. S., with map.

Sketch Map of the march of the Tal Chotiali Field Force, published by the Surveyor General of India.

Notes on the Formation of the Country passed through by the Tal Chotiali Field Force, and Rough Notes on the Distribution of the Afghán Tribes about Kandahar, to this Society.

The geography of the route, thanks to the exertions and report* of the officers of the Survey of India* who accompanied the Force, is now well known and needs no remark here. Suffice it to say that the Force was sent from the Pishin valley towards Dera Gházi Khán viâ the Kákar country and BA'RKHO'M to open up what is known as the Tal Chotiali Route, and that the present writer was attached to the 2nd or principal column of the Force. The route taken and referred to herein is shewn in detail in the map attached, which was published for me by the Surveyor General of India, and in its general aspect in the map attached to my paper on the Geology of the Route in a former number of this Journal.†

II. *The Tribes en route.*

Before proceeding to discuss what was seen of the various tribes of Afgháns along this march, it may be as well to give a brief account of what is known of the vexed question of the origin of the Paṭhán and Afghán Tribes.

The people of the nation known in India as the Paṭhán Tribes call themselves BANI' ISRA'I'L or PUKHTU'N (pl. PUKHTA'NA), and the Afgháns, as a race of these Paṭhán Tribes, claim descent from TA'LU'T‡ or SA'RU'L (the Saul of the Bible) as their ancestor. According to native accounts SA'RU'L had two posthumous sons BARAKI'A (BARACHIAH) and IRAMI'A§ (JEREMIAH), both born in the same hour of different mothers of the tribe of LA'WI' (LEVI). They rose to high postitions under David, Saul's successor; thus Barakía became prime minister and Iramía Commander-in-Chief. In SULIMA'N's (Solomon's) time they were succeeded in their posts each by his son, Barakía by ASAF and Iramía by AFGHA'NA, and Afghána is said to have had the building of the BAITU-L-MUQADDAS or Temple of Jerusalem. Asaf left 18 and Afghána 40 sons, and these founded important families or tribes. When the BAITU-L-MUQADDAS was destroyed by BAKHTU-N-NASR (Nebuchadnezzar) the Afghána Tribe, adhering to their forefathers' religion, were banished from SHA'M (Palestine) and took refuge in KOHISTA'N-I-GHOR and KOH-I-FIROZA. Here their neighbours called them Afghán (or Aoghán) or Baní Isráíl. From GHOR by degrees the Afgháns extended to the KOHISTA'N-I-KA'BUL, KANDAHA'R and GHAZNI.

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* J. A. S. B., for 1879, paper by Major Waterhouse.

† J. A. S. B., for 1879, Vol. XLVIII, Part II.

‡ Raverty. Gram. of Pushto. Introd. 1860.

§ BIRKIYA and ARMIAH according to Raverty.

Until the advent of Muhammad the Afgháns followed the religion of the Pentateuch or TAURET KHWA'N. But in the 9th year of the announcement of Muhammad's mission they heard of him from one of the Baní Isráíl by name KHA'LID-BIN-(OR IBN)-WALI'D. A deputation was sent to Medina under one KAIS (also KISH, KESH or KAISH) a leading Afghán, who became a zealous Muhammadan and received several special marks of the Prophet's favour, among which the title of malik or king, originally conferred by the Almighty on Saul, their great ancestor, was conferred individually on the Afgháns.* Arabic names also were given them; thus KAIS was called ABDU-R-RASHI'D (Servant of the Wise). And to him was also given the title of PIHTA'N (PAṬHA'N) meaning in Syriac a rudder, signifying that he, Kais, was the pilot of his people. From this Kais are descended all the Afghán Tribes properly so called, and all Afgháns are Paṭháns, the name by which the nation is most generally known in India. But there are many tribes who are Baní Isráíl and Pukhtún (Pukhtána) who are not Afgháns.

The Pukhtún, erroneously known in India as the Paṭhán Tribes, then are divided into those descended from Kais and those who are not. Those who are so descended are generally known as Afgháns and the others as merely Paṭháns, though the whole nation is also known as Paṭháns.†

The following is a list of the principal tribes of the present day generally acknowledged to be Afgháns:

1. Duránis.
2. Taríns.
3. Kákars.
4. Ghilzais.
5. Povindas.
6. Wazíris.
7. Shíránis.
8. Túris.
9. Zaimukhts.
10. Orákzais.
11. Dáwaris.
12. Khóstwáls.
13. Afrídis.
14. Tájís.
15. Mangals.
16. Jadráns.
17. Shinwáris.
18. Mómands.
19. Yúsufzais.
(Kóhistánis.)

Kais married a daughter of KHA'LID-BIN-WALI'D by whom he had three sons, SARABAN, BATAN and GURGHUSHT and from them descend some of the principal tribes above mentioned, as may be seen by the accompanying genealogy.

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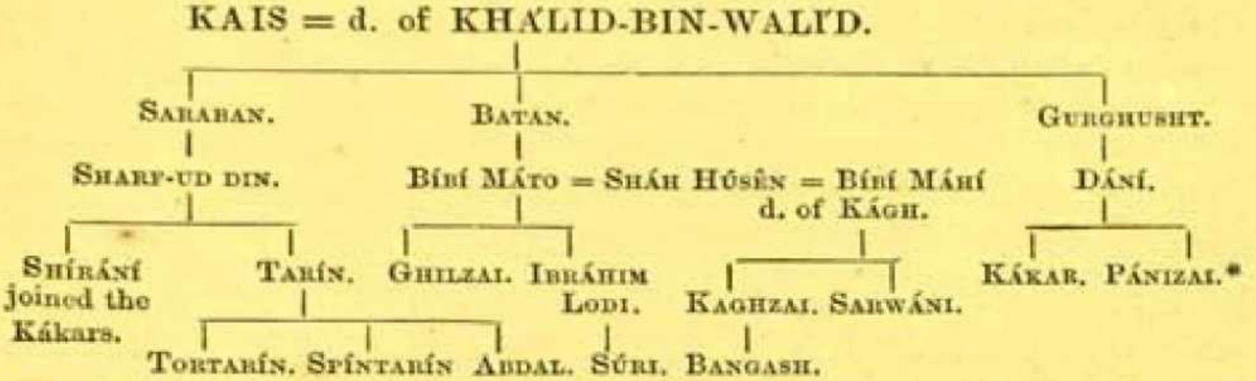
* At the present day the head of a Paṭhán family or tribal subsection is called malik.

† There are several legends to account for the names of Afghán and Paṭhán, that above given in the text is the commonest. The following are, however, worth noticing.

The word Pukhtún (Pukhtána) is said variously to be of IBRA'NÍ or IBRA'HIMÍ (Hebrew) and of SU'RIA'NÍ (Syrian) origin, and to signify "delivered" or "set free."



The above genealogy which must of course be taken for what it may be worth, includes a good many of the ancestors of the present Afghán Tribes, but not by any means all. Each, however, has its own genealogical legend. It will be observed that the Duránis, the chief or largest tribe are not included in the above genealogy.

The Paṭhán Tribes we have to deal with in this paper are the Duránis slightly, and with the Taríns, Kákars, Lúnis and Zarkháns more fully. Of

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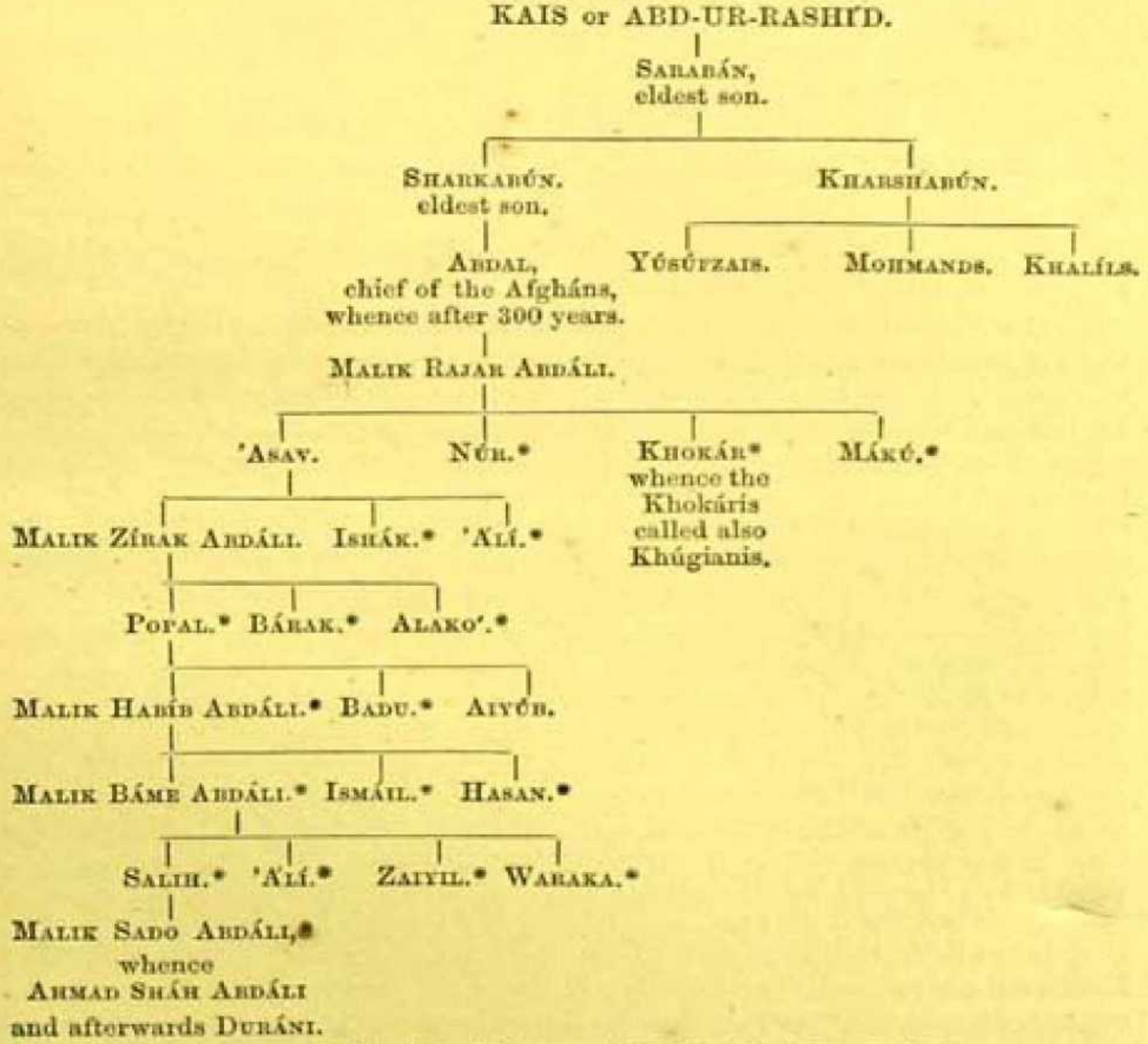
The common tradition about Afghán is, that the mother of their ancestor Afghána gave him the name because of her exclamation on the favourable answer to her prayers in the pangs of childbirth for a quick delivery, for she said on the birth of the child, "Afghána (I am free)," this being the traditional interpretation of the expression. Another tradition is, that she called out in her pangs "Arghán" or "Fighán" an expression of pain in the Persian language. According to the Kákar legends "Paṭhán" is a corruption of Pret Kẖán, the title given to the Kais above mentioned by the Prophet. Raverty in the Introduction to his Grammar of Pushto gives an extract from the Tazkirát-ul-mulúk or History of the Saddozais according to which the words Pushto (or Pukhto) and Pushtún (or Pukhtún) are derived from Pusht or Pasht the name of the place Afghána first fixed on as his residence on leaving Palestine. In the same work a characteristically oriental derivation of the word Afghána is thus given. "The original meaning of Afghánah is fighán, a Persian word which means complaint, lamentation, because he (Kais) was a cause of lamentation to the devil, the jinns and mankind. From the constant use of the word the vowel point *Kasrah* was dropped after which the other letters could not be sounded without the aid of a vowel and *alif-i-wasl* was placed before the *gh* and thus made Afghánah." And the term Paṭhán is further derived from batán or patán which in Arabic (بطان) signifies the keel (Raverty says keelson) of a vessel, "without which it cannot sail, neither can the ship of war sail along without the keel of battle."

* The true Afghán descent of the posterity of the 2nd son Batan is more than doubtful. It appears that Bíbí Máto (or Mátu) the daughter of Batan formed an illicit connection with Sháh Husein, (or Hússén, called also Mast'ali) a Persian Prince of Ghór and was made to marry him. The offspring resulting was named Ghalzai that is "the child of theft." She, however, also bore him a son Ibráhim Lódi from whom the former Paṭhán rulers of Delhi sprung. This Sháh Hussein was also by a fraud induced to marry Bíbí Máhi (or Mihi) daughter of the Kágh or bard who managed his marriage with Bíbí Máto, and from her are descended the present Kághzai, Bangash and Sarwáni Paṭháns.

these the Duránis, Taríns and Kákars are Afgháns proper and so probably are the Lúnis, but the Zarkháns are merely known as Paṭháns.

First then regarding the Duránis, the chief of the Afghán clans. The origin of this tribe is apparently unknown, but it seems to be generally believed that it emigrated from the mountains of Ghór. According to the TAZKIRA'T-UL-MULU'K above quoted, the Duráni descent is as follows:



The old name of the Duránis was Abdáli, till Ahmad Sháh, an Abdáli of the Sadozai family or subsection of the Pópalzai section of Abdális, the hero of Pánipat, in 1747 took the title of DURR-I-DURRA'N, the Pearl of Pearls, and named his tribe after himself Duránis. The two great divisions of the Duránis are ZI'RAK and PANJPA'O, and of these the most honorable by descent are the ZI'RAKS. The ZI'RAKS are usually divided into 4 sections (1)

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* Those marked with an asterisk with the addition of Zai are the names of present Duráni sections or subsections.
]

POPALZAI, (2) ALAKO'ZAI, (3) BA'RAKZAI, (4) ACHAKZAI and the PANJPA'OS into 5 sections, thus, (5) NU'RZAI, (6) Á'LI'ZAI, (7) ISHA'KZAI, (8) KHU'GIA'NI, (9) MA'KU'.[*] Along our present route, however, only the Achakzais were found in any numbers, but a few of the Pópalzais and Bárakzais were also found in the Pishin. As far as I know there is but one Pópalzai village and one Bárakzai village in Pishin, but there are a good many Bárakzais scattered about the valley formerly concerned with the late government there. The Pópalzais of the valley are of the SADOZAI subsection [†]

The BA'RAKZAIS met with in the Pishin are all MUHAMMADZAIS,[‡] connected in some way with the late government of the valley. Sirdár KHU'SHDIL KHA'N of the royal house seems to have been Governor of the

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[*] There is also a low class of Duránis called SÁOZAI found in the ARGHISÁN valley.

[†] The Sadozais were the old ruling family of the Pópalzais and under ÁSAD-UL-LAH (of the Tribe ABDÁLI, sec. Pópalzai, subsec. Sadozai) threw off the yoke of the Persian at Herát in 1716, soon after MÍR VAIS, the Ghilzai, began to assert the independence of the Afghán nation. On the assassination of NÁDIR SHÁH in 1747, AHMAD KHÁN, a Sadozai (afterwards Ahmad Sháh Duráni) gradually conquered for himself all Afghánistán and most of the Panjáb, and at his death in 1773 he was ruling from the Sutlaj to the Oxus and from the Himalayas to Khorásán. Till 1793 TAIMU'R SHA'H his son reigned, but at his death his kingdom was fought for among his children in the way so common in oriental history, mainly resulting in the loss of the Panjáb to the Sikhs. The brothers who were ruling at the time of TAIMU'R SHA'H's death were

ZAMA'N SHA'H in Kábul.
HAMA'UN SHA'H in Kandahár.
MAHMU'D SHA'H in Herát.
ABBA's MÍRZA' in Peshávwur.
KO'HANDIL MÍRZA' in Kashmír.

Of these ZAMÁN SHÁH and MAHMÚD SHÁH obtained the throne of Afghánistán with the usual bloodshed, and after them another brother, the famous SHÁH SHÚJAH-UL-MULK, about 1809. Mahmúd Sháh, however, ousted him and again ruled till 1818, when he was deposed by the BA'RAKZAI brothers, sons of PAIND KHÁN, his Wazír, and son of ḤÁJÍ JAMÁL KHÁN (a MUHAMMADZAI BÁRAKZAI), the Sirdár who had helped Ahmad Sháh in the early days of his sovereignty. Since that date the Mohammadzai Bárakzais have fought among themselves for the throne resulting in the victory and sovereignty successively of the Amirs Dost Mohammad Khán, Shér Áli Khán and YaSúb Khán the late ruler. In 1839 the first Afghán war, the history of which is of course still fresh in our memories, was undertaken to restore Sháh Shújah-ul-mulk, the Sadozai, to his throne at Kábul. The Sadozais are still highly respected, and the Pópalzais from which they sprung are the most honoured among Afghán Tribes. During the greater part of the Sadozai ascendancy, the ministers were chosen from the BÁME'ZAI subsection of the Pópalzais. The chief other subsections of the Pópalzais as far as I could ascertain are (3) MARSINGZAIS, (4) KHA'NZAIS, (5) AIYÚBZAIS, (6) MADOZAIS, (7) NO'AZAIS.

[‡] The other subsection of the Bárakzais as far as I could ascertain were (2) ACHALZAIS, (3) SULIMÁNZAIS, (4) KHUNSEI'ZAIS, (5) BAIANZAIS.

Pishin under Shér A'lí, but never to have lived there, and I was quite surprised to find how little appeared to be known about him locally. His fort, called Khúshdil Khán, is in the north-east corner of the Pishin, and from it his Naib or Lieutenant Nu'r Muhammad Kha'n (Muhammadzai Bárakzai) seems to have ruled and collected the revenues. This last fled at our advance into the Pishín in 1878, and the valley was handed over for government under Sir R. Sandeman, agent for Beluchistán, with the fort Khúshdil Khán, to another Nu'r Muhammad Kha'n, Luga'ri', a Belóch in our service as Názim or ruler.* This Khúshdil Khán's descent was given me locally, thus:

HA'JI' JAMA'L KHA'N (temp. Ahmad Sháh Duráni.)
- Sirda'r Paind Kha'n (Muhammadzai Bárakzai)
  - Mihardil Kha'n.
    - Khu'shdil Kha'n. Governor of Pishin, 1878.
  - Pu'rdil Kha'n.
    - Mi'r Afzu'l Kha'n. Governor of Kandahar, 1878.
  - Dost Muhammad Kha'n, Amír of Kábul.
    - Sher A'li' Kha'n, Amír of Kábul.
      - Yaḳu'b Kha'n, Amír of Kábul.†

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* Another and perhaps the most true local story is that Khúshdil Khán died about 7 years ago, say 1872, and in former days Abd-ul-Karím Khán (Muhammadzai, Bárakzai) was his Naib, but on Shér 'Alí's final accession in 1869, Khúshdil Khán lost his government and went to reside in Kandahár, while Nu'r Muhammad Kha'n (Muhammadzai Bárakzai) was sent to govern the Pishin direct from Sher 'Alí himself.

† Paind Khán's sons by 5 mothers were—

1. Fateh Kha'n Wazir of Mahmúd Sháh,
   Muhammad A'zim Kha'n,
   Taimu'r Kha'n.
2. Pu'rdil Kha'n, Governor of Kandahár,
   Sherdil Kha'n, Governor of Kandahár,
   Kohandil Kha'n, Governor of Kandahár,
   Rahimdil Kha'n,
   Mihardil Kha'n.
3. Do'st Muhammad Kha'n, Amír of Kábul,
   Ami'r Muhammad Khán,
   Jamál Khán.
4. Sultán Muhammad Khán,
   Yár Muhammad Khán,
   Pír Muhammad Khán,
   Sayad Muhammad Khán.
5. Nawáb A'sad Khán,
   Nawáb Sama't Kha'n,
   Nawáb Jabar Khán.

The Achakzai section of the Duránis is the tribe inhabiting the mountains known as the Khoja Amra'n Range, the Toba Plateau, and the Pishin and Kadanei valleys in part. They are said to have been divided off from the Bárakzais by Ahmad Sháh, as that tribe was getting too powerful, and I have met Paṭháns about Kandahár, who classed the Achakzai as a Bárakzai subdivision. The Achakzais are divided into Baha'durzais and Gajanzais.

BAHA'DURZAIS.

Ghabezais.
Ka'kozais.
Shamuzais.
Fa'mzais.
Ba'karzais.
Ishda'nizais.

GAJANZAIS.

Ahmadzais.
Ashezais.
Bu'rhanzais.
Shamakzais.
Ma'lizais.
Ka'milzais.
A'dazais.
Adrakzais.
Hamzais.
Malikzais.
La'lizais.
Ma'pizais.
Hu'senzais.
Sulima'nzais.
Abdullazais.
Ba'zamzais.
Alozais.
Julizais.
Mushkizais.
Ba'dazais.
Shakarzais.
Usma'nzais.

I, however, came across two subsections of Achakzais not here mentioned called Habi'bzais[*] and Abdals in the Pishin. This name Abdal may perhaps only be the title of the malik or chief as the present Sirdár Mir Aslam Kha'n of the Achakzais is locally called Mír Aslam Khán Abdal or Abdáli, as also is Madat Kha'n, the head of an Achakzai village in the Pishin, called after him. All the inhabitants of the last village, however, are called Abdals.

The next clan we have to deal with are the Taríns. These are the second of the Afghán Tribes in point of importance and national estimation. Their legendary descent from Kais is clearly made out. Saraban, Kais's eldest son, had five sons of whom the second was Tarín. Tarín had three sons, Tór Tarín, Spín Tarín and Abdal, and from the two eldest are descended the modern Tarín Tribe. According to a legend Tarín's dark son was called Spín Tarín or Fair Tarín, and his fair son Tór Tarín or Dark Tarín. The Tór Taríns inhabit the Pishin valley and the Spín Taríns the country about Tal and Chotiáli. Lumsden subdivides this clan as follows:

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[*] Lumsden, however, makes out the Habi'bzais to be Tór Taríns, but as far as I could ascertain, they are Achakzais.

TOR TARÍNS.

BATAZAIS.
HAIKALZAIS.
MÁLIZAIS.
KADAZAIS.
KHÁNIZAIS.
KHÁMZAIS.
ÁLÍZAIS.
NÚRZAIS.
KULÁZAIS.
MÚSIZAIS.
ABDURRAHMÁNZAIS.
HABÍBZAIS.
HAMRÁNZAIS.
KARBELAS.
SÁZAIS.

SPÍN TARÍNS.

SHÁDÍZAIS.
MARPÁNIS.
LASRÁNIS.
ADWÁNIS.

This list agrees with that given me *en route* as far as the Spín Taríns are concerned, but as regards the Tór Taríns mine differs considerably. First I would remark that the HABÍBZAIS are, as far as I could make out, Achakzais and not Taríns at all. Next as regards the Karbélas, who have been hitherto put down as Taríns somehow connected with the Pishin Sayads, I have ascertained the following particulars. The Karbélas inhabit a village of the same name near SAYAD PAIND in the Pishin and call themselves Sayads. They are, however, disowned by the Sayads and also by the Taríns, Kákars and Duránis. The local legend regarding their origin is this. In days gone by, a little child by name Karbéla, was travelling through the Pishin in a káfila. He lost his party and was seen running along the road, crying, by a kind-hearted SAYAD who took him in and nourished him, but declined to admit him into his family or sect. On growing up, he married a Tarín woman, and from him there sprang by Tarín intermarriages the present race of Karbélas, now said to be 600 strong in men. This is the Sayad version of the story, the Tarín legend is the same except as regarding intermarriages with themselves. They say the mother of the original Karbélas came from no one knows where and disown the whole race. The probabilities are, they sprung from Paṭháns who had to take refuge in the Pishin from some other distant place. The KHÁNIZAIS are divided into LÚR KHÁNIZAIS and DAB KHÁNIZAIS according to my information. In the list of Tór Taríns which I collected, the following do not appear in Lumsden.*

MÁLIKYÁRS
MÁEZAIS
MANZAKAIS
HÁRU'NS.
KAMÁLZAIS.

While his list contains the following which are not found in mine.

KÁDAZAIS
KHÁMZAIS
NÁOZAIS
ABDURRAHMÁNZAIS
HAMRÁNZAIS.

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* There are a few trifling variations in some names regarding which see below on Language.

The probabilities are that a combined list would reach nearest the true statement of their subsections.[*]

Like the Taríns, after whom they rank, *i. e.*, third on the list of clans, the Kákars claim direct descent from KAIS. Firstly, Kais's third son was GURGHUSHT who had three sons DÁNÍ, BÁBÍ and MANDÍ. Of these DÁNÍ had four sons, KÁKAR, NÁGHAR, DÁDÍ and PÁNÍ.[†] Secondly SHÍRÁNÍ the eldest son of SHARÍF-UD-DI'N, eldest son of SARABAN Kais's eldest son, on account of family squabbles joined the Kákars and called himself a GURGHUSHTAI. Such is the common legend. The Kákars themselves vary it thus. Kais went to Mecca and there obtained the name of PRET KHÁN (elsewhere PIHTÁN). His eldest son SHARÍF-UD-DIN or SARABÁN had five sons SHÍRÁNÍ, TARÍN, MYUNÍ, BARECHÍ[‡] and UMAR-UD-DÍN. The mother of SHÍRÁNÍ, who was a Kákar, finding that her husband intended making TARÍN, his second son, his heir, left his protection and returned to her own tribe. Her descendants have therefore been included among Paṭháns and with them the whole of the Kákars under one name. This subverts the other legends which make the Kákars claim descent through GURGHUSHT from KAIS.

The following clans claim relationship with or descent from the Kákars. The GÁKARS of Kashmír along the Jhilam, the TAIMUNIS (EIMAKS) of GHOR, the FIROZKOHÍ HAZÁRAS (EIMAKS) of HERÁT, the KAYÁNIS of SEISTÁN,[§] and lastly the KÁKARS and GHILZAIS also consider themselves nearly related in blood. Taking into consideration the unquestionably mixed blood of the Ghilzais and their legendary relationship with the Kákars, as also that of such pure EIMAKS as the HAZÁRAS and TAIMUNÍS,[‖] the Kákar descent from Kais would seem to be doubtful.

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[*] Among the tribes of Tarín descent are said to be the ZAIMUKHTS.

[†] This would make the PA'NI'ZAIS separate from the Kákars, but they seem to be considered a section of them at the present day.

[‡] Whence the BARE'CHI' Paṭháns of SHORA'WAK.

[§] Usually called Belóchis, but really descendants of SANDAR KHE'L Kákars.

[‖] A pure EIMAK is perhaps, however, a misnomer. The origin of the race being quite obscure. By features they are TA'TARS and by language Persians. They are divided into TAIMU'NI'S, HAZA'RAS, TAIMU'RI'S and ZU'RI'S. It may help towards the solution of the Eimak origin to quote the following from Yule's Marco Polo, I, 94. "Contemporaneously with the KARAUNAHS (or KARA'WINAHS the celebrated robbers of mediæval Persia) we have frequent mention of predatory bands known as NIGU'DARIS who seem to be distinguished from the KARAUNAHS, but had a like character for truculence. Their head-quarters were about SIJISTA'N, and Quatremère seems disposed to look upon them as a tribe indigenous in that quarter. Hammer says they were originally the troops of Prince NIGU'DAR, grandson of CHAGATAI (CHAGATAI was the ruler and curse of Turkistán and a son of CHINGIZ and therefore brother to OKKODAI and uncle to MANGKU, KUBLAI and HULA'KU), and that they were a rabble of sorts, Mongols, Turkmáns, Kurds, Shúls and what not. We hear of their revolts and disorders down to

The Kákar Territory extends from the Pishin valley to the Borai valley and from the Zhób valley to Quetta, the line of the Bolán Pass and the MARRI (Belóch) country. They are divided into two main divisions, the Great Kákars (LOWE' KÁKAR) and the Lesser Kákars (KUCHNAI KÁKAR). As regards the Great Kákars, the present writer had but little opportunity of learning much. They occupy the Zhób valley and apparently are divided into—

KHWAIDÁDZAIS,
MURSIÁNGZAIS,
AKTARZAIS,
AWAZAIS,
MEHTARZAIS,
SARGARAIS.

And probably also the JALAGAIS, MU'SA KHEL and KARÍZAIS belong to this division.

The Lesser Kákars are divided into SULIMÁN KHELS; AMAND KHELS; MEHTARZAIS; PÁNÍZAIS; BÁZAIS; SHAMOZAIS; SURGARAIS; MALAGAIS; ISÁ KHELS; SARA'NGZAIS, of which MULÁZAIS and TÁRÁNS are subsections; ZAKHPELS, subdivided into AMAKAIS, KANOZAIS and NÁOZAIS; DUMARS; UTMÁN KHELS; and SANDAR KHELS, whose known subdivisions are ÁLÍZAIS, SHABOZAIS, MU'RS, DARGAIS, WAHÁRS and TENIZAIS.* The Kákars about KHUNCHAGAI near Mt. KAND, variously called the SANATÍA and SIMANTHA Kákars, are I believe the AMAND KHEL above mentioned. They were formerly, under the name of TARGHÁNÍS, under HÁJÍ KHÁN of infamous memory during the war of 1839, and his son KÁMIL KHÁN is now chief of the AMAND KHEL.

The next clan met with *en route* was the LU'NI (properly LONAI) KHEL, about whom very little is known. They are generally supposed to be Kákars by descent, but I should say from what I heard from the LU'NIS themselves and from the Kákars, this is not the case. They call themselves of DURÁNI descent, a claim which is allowed by their neighbours. The HAMZAZAIS are the only known subdivision of this Tribe, but there are

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1319, up to which date MIRKHOND says that there had been 21 fights with them in 4 years. Again we hear of them in 1336 about Herát, whilst in Báber's time they turn up as NUKDARIS fairly established as tribes in the mountainous tracts of KARNU'D and GHOR to the west of Kábul, and coupled with the Hazáras who still survive both in name and character. Among them, says Báber, are some who speak the Mongol languages. The Hazáras are eminently Mongol in feature to this day, and it is very probably that they or some part of them are descendants of the KARAUNAHS or NIGU'DARIS or of both, and that the origination of the bands so called from the scum of the Mongol inundation is thus in a degree confirmed. It is worthy of notice that Ab-ul-Fazl who mentions the NUKDARIS among the nomad tribes of Kábul says, the Hazáras are the remains of the Chagataian army which MANGKU KHA'N sent to the aid of HULA'KU under the command of NIGU'DAR OGHZA'N.

* The Esóts of the DE'RAJA'T are sometimes called Kákars but this is doubtful. KA'SI' KA'KARS are said to inhabit the SHA'L Valley (Quetta), but I did not see any there.

doubtless more, and I think it would be safe to include SARÁGIS amongst them. They inhabit a largish extent of country, for the most part considerably deserted, and used merely as grazing-ground. Their villages are mostly found in what is called the LU′NI Valley to the south of the Bórai, *i. e.*, between it and the Tal Valley. All the country from the Bórai Valley east of the Tal Valley as far as the Belóch Border and the MU′SA KHEL country belongs to them, except the small portion occupied by the ZARKHA′NS near Chótiáli.

Of the ZARKHA′NS nothing more is known except that they are Paṭháns and not of Kákar, Tarín or Lúni extraction. They are to be found about the mountains to the east and south of Chótiáli, in the HANOKAI Pass and BA′LA′ DHA′KA′. The MARRIS have nearly wiped them out as a race by continual raids. In Leech's time[*] there were three villages belonging to them near Chótiáli, *viz.*, DOST MUHAMMAD, FAZL KHAN and A′LÍ KHAN, but I do not know if they still exist.

Perhaps the origin of the Lúnis and Zarkháns and even of some of the Kákars, especially the Sandar Khél, should be sought with that of the neighbouring Belóch Tribes, if one could only ascertain what that is. Indeed the KAYANIS of SEISTAN usually called Belóchis, are Sandar Khél Kákars, and there is nothing repugnant in the history of the Belóch Tribes to the idea of some of them being of the same descent as their deadly enemies the Paṭháns. For the KAIHÍRIS about CHATTAR and PULEJI in KACHI, now acknowledged to belong to the Belóch Tribes, are of unquestioned Paṭhán descent.[†] And, although the presence of many Belóchi words in their dialects may be the result of propinquity, the similarity of face and figure of the LU′NIS, SANDAR KHELS and ZARKHA′NS to the neighbouring Belóch Tribes of BA′RKHO′M is quite remarkable, and they might well have a common origin with them, especially as the Belóchis can hardly be called a nation, being rather an agglomerate of heterogeneous tribes. Thus the BRAHO′IS are probably aboriginal, the GURCHA′NIS a Sindian Tribe, the RINDS and LU′MRIS probably of Hindú (Rájpút) origin and the GA′DURS of LAS of Arab descent, while the tribes of MAKRA′N are Arabs, Sikhs, Sindhís, Persians, Jats and what not.[‡]

[*] Major Leech's journeys were made about 1839.

[†] Hughes's Beluchistán.

[‡] In connection with the probable Turkmán or Mongol origin of the bulk of the Belóch Tribes, the words TUMAN and TUMANDA′R are interesting. TUMAN or TOMAN was a Mongol division of the army, *viz.*, 10,000, and hence in the Mongol dominions it came to mean 10,000 generally. WASSA′F describing KINSAY (KINGSSE′ or HANGCHAU) states it had "70 TOMANS of soldiers and 70 TOMANS of RAYATS." Marco Polo states its revenue in TOMANS of gold and Friar Odoric in TOMANS of BALISH (paper money). TMAN or TMA is still used in Russia for 10,000. In Beluchistán TUMAN means a camp and TUMANDA′R the commander of a camp and thence the chief of a tribe, but whether

While discussing the Paṭhán Tribes something should be remarked about the SAYADS found in every part of Afghánistán* and in some numbers in the Pishin where they own several villages. Wherever they may happen to be, they are a sect apart from the surrounding inhabitants, are always respected and seem to be more intelligent than the Paṭháns in general. They are not considered Paṭháns and claim to be of Arab descent as their name implies. This claim, however, is I think of a slender description among the Sayads in the Pishin with whom we have now to do. Their sympathies are all Afghán, they are subdivided in a suspiciously similar manner, and the story of their descent confirms the suspicions as to their separate origin from the Paṭháns about them. The story is that HA'RU'N, fifth in descent from Kais, had a daughter who married an Arab Sayad who visited him, and from her are said to be descended all the Pishin Sayads, notably the SHA'DIZAIS and HAIDARZAIS.† The present subdivision of the Pishin Sayads appear to be—

GANGALZAIS.
BAGARZAIS.
AJABZAIS.
SHA'DÍZAIS.
BRAHAMZAIS.
HAIDARZAIS.‡
YA'SINGZAIS.
URUMZAIS.

The following table shows the subdivisions of the tribes above discussed as far as known.

No.	Tribe.	No.	Division.	No	Section.	Subdivision.	No.	Subsection.
I.	DURA'NI OR ABDA'LI.	1	ZÍRAK.	1	POPALZAI.		1	SADOZAI.
							2	BA'MÉ'ZAI.
							3	MARSINGZAI.
							4	KHA'NZAI.
							5	AIYU'BZAI.
							6	MADOZAI.
							7	NOAZAI.
				2	ALAKO'ZAI.		1	JALUZAI.
							2	MELAZAI.
							3	SARKA'NI.
							4	SANDARZAI.
							5	KA'REZAI.
							6	NAUSAZAI.

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this is due to the passage of the Mongols through their country on towards Hindustán or to their Central Asian origin does not appear. Yule's Marco Polo, I, 94, 281 and II, 169, 171.—Hughes's Beluchistán.

* I saw one village of them in BA'RKHO'M among the Independent Belo'ch Tribes.

† According to one legend, the KARB'ELAS are descended from a waif picked up by this HA'RU'N. See above.

‡ Among the Pishin Sayads faces of a SI'DI' type are not uncommon, and I saw one woman with purely African features near A'LI'ZAI. This may result, however, from their wandering habits and be no indication of descent.

No.	Tribe.	No.	Division.	No.	Section.	Subdivision.	No.	Subsection.
I.	DURA'NI OR ABDA'LI.	1	ZÍRAK.	3	BA'RAKZAI.		1	MUHAMMADZAI.
							2	ACHALZAI.
							3	SULIMA'NZAI.
							4	KHU'NSEZAI.
							5	BAIANZAI.
				4	ACHAKZAI.	BAHA'DURZAI.	1	GHA'BEZAI.
							2	KA'KOZAI.
							3	SHAMUZAI.
							4	FA'MZAI.
							5	BA'KARZAI.
							6	ISHDANIZAI.
							7	ABDAL.
						GAJANZAI.	8	AHMADZAI.
							9	ASHEZAI.
							10	BURHAMZAI.
							11	SHAMAKZAI.
							12	MA'LIZAI.
							13	KA'MILZAI.
							14	ADAZAI.
							15	ADRAKZAI.
							16	HA'ZUZAI.
							17	MA'LIKZAI.
							18	LA'LIZAI.
							19	MA'PIZAI.
							20	HUSENZAI.
							21	SULIMA'NZAI.
							22	AB'DULAZAI.
							23	BA'ZAMZAI.
							24	ALOZAI.
							25	TULIZAI.
							26	MUSHKIZAI.
							27	BA'DIZAI.
							28	SHAKARZAI.
							29	USMA'NZAI.
							30	HABI'BZAI.
I.	DURA'NI OR ABDA'LI.	2	PANJPA'O.	5	NU'RZAI.		1	CHA'LAKZAI.
							2	BA'DIZAI.
				6	A'LIZAI.		1	HASSANZAI.
							2	ALAKZAI.
							3	GWARAZAI.
				7	ISHA'KZAI.		1	HAWAZAI.
							2	TEROZAI.
							3	MANDARZAI.
							4	I'DZAI.

No.	Tribe.	No.	Division.	No.	Section.	Subdivision.	No.	Subsection.
I.	Dura'ni or Abda'li.	2	Panjpa'o.	8	Khu'gia'ni.	Sirki Wazi'ri.	1	Ra'ni Khel.
							2	Nani.
							3	Aga'm.
						Motik Wazi'ri.	4	Pi'ra Khel.
							5	Ahmad.
							6	Khozeh.
						Khairbu'n.	7	Naji'bi.
							8	Kharai.
						Sherzah.	9	Panjpai.
							10	Dopai.
							11	Khidar Khel.
				9	Ma'ku.			
				10	Sa'gzai.			
II.	Tari'n.	1	Tor Tari'n.	1	Batazai or Badozai.			
				2	Kha'nizai.		1	Lu'r Kha'nizai.
							2	Dab Kha'nizai.
				3	A'li'zai.			
				4	Nu'rzai.			
				5	Kula'zai.			
				6	Mu'sizai.			
				7	Segai.			
				8	Ma'likya'r.			
				9	Maezai.			
				10	Haikalzai.			
				11	Manzakai.			
				12	Ma'likai.			
				13	Ha'ru'n.			
				14	Kama'lzai.			
				15	Kadazai.			
				16	Kha'mezai.			
				17	Naozai.			
				18	Abdurrahma'nzai.			
				19	Hamra'nzai			
II.	Tarín.	2	Spi'n Tari'n.	20	Sha'dizai.			
				21	Marpa'ni.			
				22	Lasra'ni.			
				23	Adwa'ni.			

No.	Tribe.	No.	Division.	No.	Section.	Subdivision.	No.	Subsection.
III.	Ka´kar.	1	Lowe´ Ka´kar	1	Khwaida´dzai.			
				2	Mursia´ngzai.			
				3	Aktarzai.			
				4	Awazai.			
				5	Mehtarzai.			
				6	Surgarai.			
				7	Jalagai.			
				8	Mu´sa Khel			
				9	Kabi´zai.			
				10	Ba´rakzai.			
		2	Kuchnai Ka´kar.	11	Sulima´n Khel.		1	Tragarai.
				12	Amand Khel or Simantha or Sanati´a.			
				13	Mehtarzai.			
				14	Pa´nizai.		1	Adizai.
				15	Ba´zai.			
				16	Shamozai.			
				17	Surgarai.			
				18	Malagai.			
				19	I´sa´ Khel.			
				20	Sara´ngzai.		1	Mula´zai.
							2	Ta´ra´n.
				21	Zakhpe´l.		1	Amakai.
							2	Kanozai.
							3	Naozai.
				22	Dumar.			
				23	Utma´n Khel.			
				24	Sandar Khel.		1	A´li´zai.
							2	Shabozai.
							3	Múr.
							4	Dargai.
							5	Waha´r.
							6	Tenizai.
							7	Kayani.
IV.	Lu´ni Khel.	1	Hamzazai.					
		2	Sara´gi.					
V.	Zarkha´n.							

Tribes of doubtful Afghán descent.

I. SAYAD.	1	GANGALZAI.
	2	BAGARZAI.
	3	AJABZAI.
	4	SHA'DIZAI.
	5	BRAHAMZAI.
	6	HAIDARZAI.
	7	YA'SINGZAI.
	8	URUMZAI.
II. KARBELA.		

(To be continued).

On the Súryaprajñapti.—By DR. G. THIBAUT, *Principal, Benares College.*

PART I.

Until recent times our knowledge of the cosmological and astronomical system of the Jainas was very limited and founded not on an independent investigation of the original Jaina literature, but only on the occasional references made to Jaina doctrines by the orthodox Hindu writers on astronomy. For a long time the short account of the subject given by Colebrooke in his "Observations on the sect of the Jainas" (Asiatic Researches, 1807; Essays, Vol. II), remained the only one, and although accurate as far as it goes, it is very insufficient since it chiefly refers to the one doctrine of the Jainas only, which has at all times struck outsiders as peculiarly strange and absurd, *viz.*, the assertion that there exist two suns, two moons and a double set of constellations. This is indeed the doctrine by which the system of the Jainas could most easily be distinguished from similar old Indian systems, and it is consequently referred to and controverted with preference in the Siddhántas. The best known passage from the latter is the one quoted by Colebrooke from Bháskara's Siddhánta-S'iromaṇi. "The naked sectaries and the rest affirm that two suns, two moons and two sets of stars appear alternately; against them I allege this reasoning. How absurd is the notion which you have formed of duplicate suns, moons and stars, when you see the revolution of the polar fish."

This passage of Bháskara's is manifestly founded on a passage found in Brahmagupta's Sphuṭa-Siddhánta where we read in the so-called Dúshaṇádhyáya:

भानि चतुः पञ्चाशत् द्वौ द्वावर्केन्दवो जिनोक्तं यत्।
ध्रुवमत्स्यस्यावर्त्तो भवति यतोऽह्ना ततस्तदसत्॥

"There are fifty-four nakshatras, two risings of the sun; this which has been taught by Jina is untrue, since the revolution of the polar fish takes place within one day."

And a passage to the same effect occurs in the 13th adhyáya of Varáha Mihira's Pañchasiddhántiká.

In 1868 Professor A. Weber, to whom we are indebted for our first acquaintance with so many works of Indian literature, published in the tenth volume of the "Indische Studien" a paper on the Súryaprajñapti, being apparently the most important astronomical book whose authority the Jainas acknowledge, and it then appeared that the doctrine of the existence of two suns, moons, etc. constitutes only one feature of a comprehensive system which on the whole is much less fantastical than might have been expected and which, fantastical or not, shows intimate relations to the astronomical and cosmological views which appear to have prevailed all over India before Greek science began to influence the East. Especially it appeared—as pointed out by Professor Weber—that the doctrine propounded in the Súryaprajñapti shows in many points an unmistakable resemblance with that contained in the Jyotisha-Vedáñga the presumably oldest specimen of Indian astronomical literature, and it thus became manifest that the astronomical books of the Jainas do not only furnish information about the opinions held by a limited religious sect, but may, if rightly interrogated, yield valuable material for the general history of Indian ideas. The writer of the present paper has therefore thought it worth while to submit the Súryaprajñapti to a renewed detailed investigation, whereby we should be enabled rightly to esteem its position in the astronomical literature of India, clearly to conceive the peculiar features distinguishing the astronomical system of the Jainas from other systems, and on the other hand to point out what the Jaina system has in common with other systems, and in what way therefore it may be employed for the elucidation of the latter. Professor Weber's paper gives in the main only a short summary of the contents of each chapter of the Súryaprajñapti, following the order of the chapters as found in the work itself and omitting none of them. This was of course the right plan to adopt in a paper giving the first account of a hitherto unknown book. In the present paper it has on the other hand been preferred to give a connected account of the chief doctrines only which are found in the Súryaprajñapti, to combine hints found in the various parts of the work wherever this appeared necessary for the sake of greater clearness, and again altogether to omit relatively unimportant matter. It must be stated at the outset that this paper—like that of Professor Weber—is based more on Malayagiri's commentary on the Súryaprajñapti than on the text of the latter work itself; which apparently anomalous proceeding finds its explanation in the fact of the Manuscripts of the Súryaprajñapti, commonly met with, containing the commentary only *in extenso*, while as a rule only the first words of the passages commented on are given. As it, however, appears that the commentary faithfully follows the text, and as on the other hand the latter, devoid of a commentary, would be hardly intelligible, the absence of a complete text of the Súryaprajñapti is less inconvenient that might at first be assumed. At any rate we may obtain at present a sufficiently full and accurate knowledge of the contents of the book; and in works of the class to which it belongs the interest attaching to the form is a comparatively small one. As already stated, the present paper is by no means intended as an exhaustive review of the contents of the Súryaprajñapti; it is rather meant as an introduction to a complete edition of the work itself which, on account of the various old materials it contains, well deserves to be published *in extenso*. And an introduction of this kind could not well be missed, even if we possessed a complete edition or translation of the book, as the reader of the text of the work or of a literal translation of the text would find it by no means an easy task unaided to reconstrue the leading features of the system.

The Súryaprajñapti is written in Jaina-prákṛit, and divided into twenty books called prábhṛitas, some of these again into chapters, called prábhṛitaprábhṛitas. The arrangement of the matter treated of is by no means systematical, and the text, still more the commentary are full of tedious reiterations. Malayagiri, the commentator, has done his work most conscientiously; too conscientiously, the reader afflicted by his extraordinary diffuseness often feels tempted to say. Especially he delights in illustrating the numerical rules given in the text by at least half a dozen examples, where one would have sufficed, dwelling with evident complacency on each step even of the simplest calculation. But his comments are very perspicuous and certainly deserve to be extracted, although not to be reproduced *in extenso*.

Proceeding now to our proposed task, let us dispose at the outset of the distinctive doctrine of the Jainas according to which there are two different suns, two moons and two sets of constellations. When inquiring into the origin of this certainly peculiar notion, we are led to a very simple reason, an impartial consideration of which makes the Jaina system appear much less fantastical and arbitrary than we at first are inclined to think. This reason has already been pointed out by Colebrooke, Asiatic Researches, Vol. IX, p. 321, where he says " They (the Jainas) conceive the setting and rising of stars and planets to be caused by the Mountain Sumeru and suppose three times the period of a planet's appearance to be requisite for it to pass round Sumeru and return to the place where it emerges. Accordingly they allot two suns, as many moons, and an equal number of each planet, star and constellation to Jambudvípa; and imagine that these appear on alternate days south and north of Meru." These words scarcely require anything added to be to them in the way of comment. The Jainas hold (as will be seen in detail further on) the old Indian idea of sun, moon and stars revolving round Mount Meru. To anybody holding this opinion, the question must have suggested itself "In what time is one such complete revolution performed?" The prevailing opinion, represented for instance by the Puráṇas, was that the whole revolution is performed in twenty-four hours, so that the sun describes during the time when it is day in Bharatavarsha the southern half of his circle, and during the time when it is night to the south of Mount Meru, and day in the countries north of it, the northern half. The Jainas, however, took a different view of the matter. To them it seems to have appeared more appropriate that as there are four directions—south, west, north and east—the sun's circle should be divided into four quarters corresponding to the four directions, and that he should bring day in succession to the countries to the south, west, north and east of Meru But then, as it must be supposed that his passing through each of the four quarters occupies the same time, how can it come about that he again appears to rise to the Bharatavarsha after the lapse of a period only sufficient to advance his place by one quarter of the circle? Out of this difficulty the Jainas extricated themselves by simply assuming that the sun rising on a certain morning is not the same sun which had set on the preceding evening, but a second sun similar in every way to the first one. The whole circle is thus described by two suns separated from each other by half the circumference, each of which appears in the Bharatavarsha on alternate days. The same reasoning lead to the assumption of two moons and two sets of stars.

Great as appears to be the difference produced by this hypothesis between the system of the Jainas and the commonly received opinions, it practically is of very small importance and may—as will be done in the following—as a rule be left altogether out of account whenever we have to consider the motions of sun and moon. When for instance the sun having started from Aśviní has passed through the twenty-eight nakshatras, he enters, according to the generally received opinion, again into the same nakshatra Aśviní, according to the Jaina opinion into a second nakshatra called Aśviní too; but as this second nakshatra has the same name, the same extent, and the same relative position as its namesake, as like the latter it is preceded by Revatí and followed by Bharaṇí, and as at the same time when the sun has entered into the second Aśviní, another sun the exact and indistinguishable counterpart of the former one has entered into the former Aśviní, it is clear that we may, when speaking of the motion of the heavenly bodies, save ourselves the trouble of continually referring to two suns, two moons and two sets of nakshatras and, remembering that there are two of each kind, express ourselves as if there were only one. To proceed.

The astronomic-chronological period on which the system of the Súryaprajñapti is based, is the well-known quinquennial yuga or cycle with which we have long been acquainted from the Jyotisha Vedáñga. The same cycle is described in the Garga Saṃhitá as we see from the extant fragments of the latter work, and we learn from Varáha Mihira's Pañchasiddhántiká that it likewise formed the fundamental doctrine of a Paitámaha Siddhánta which, according to Varáha Mihira's judgment, was one of the more important Siddhántas known at his time. It is alluded to and rejected in a few words by Brahmagupta in the dúshaṇádhyáya of the Sphuṭa Brahma-siddhánta. References to this cycle are met with in the early history of Buddhism. Whether the so-called Vedic literature is acquainted with a cycle of this nature is doubtful.* It will not be necessary to dwell in this place at length on the constitution of the yuga; it will suffice to state that it is based on the assumption of five sidereal revolutions of the sun being exactly equal in duration to sixty-seven periodical revolutions of the moon and to sixty-two synodical months, while one complete revolution of the sun is supposed to be performed in three hundred and sixty-six days. That a cycle of this nature based as it is on an utterly wrong assumption could maintain itself for a considerable time as it manifestly has done is a matter for legitimate wonder, and does not find a parallel in the history of chronological systems among any other civilized nation. At the end of one yuga already the quantity of the error induced by the mistaken estimation of the length of the solar year amounts to nearly $5 \times \frac{3}{4} = 3\frac{3}{4}$ days, the accumulation of which quantity after the lapse of a few yugas could not escape the attention, we should think, of even the most careless observers. The matter would indeed lie altogether differently if a conjecture (or as it stands we might almost say, an assertion) of Colebrooke referring to this point had been verified. He—after having given an account of the manner in which the Jyotisha-Vedánga manages to maintain harmony between civil and lunar time—continues "and thus the cycle of five years consists of 1860 lunar days or 1830 nycthemera, subject to a further correction, for the excess of nearly four days above the true sidereal year: but the exact quantity of this correction and the method of making it, according to this calendar, have not yet been sufficiently investigated to be here stated." The fact is that of this correction which Colebrooke considered so indispensable, that he speaks of it as being actually found in the Vedánga, no traces are to be found either in the Vedánga itself or—and this is of great importance as the Vedánga is still partially unexplained—in the Súryaprajñapti which illustrates the constitution of the quinquennial yuga in the most diffuse manner, but has nothing to say about a correction of the kind mentioned.—The subdivisions of the yuga are in the Súryaprajñapti described with great fulness; what is really essential admits, however, of being stated in a few words. Each solar year is divided into two ayanas of one hundred and eighty-three days each. Each ayana in its turn comprises six solar months, each of which lasts 30½ days. Two of these solar months constitute a solar season; the reckoning of the seasons starts, however, not from the beginning of the yuga, but the latter is made to mark the middle of a season, so that the rainy season which counts as the first begins a month before the beginning of the yuga. Again the yuga comprises five years of 360 days each, each year in its turn being divided into twelve months of 30 days each; in the Súryaprajñapti this kind of year—commonly known as the sávana year—is called the *karma-year* or *ṛitu-year* which latter name would more properly be given to the solar year. The six days by which this year is shorter than the solar year are called atirátras. Again the yuga comprises sixty-two synodical months, the first of whom begins with the moon being full in the first point of Abhijit. Each of these months is divided into a light and a dark half; each half comprises fifteen tithis or lunar days of equal duration. Sixty-two of these months being equal in duration to sixty-one karma-months of 30 days each, it follows that sixty-two tithis are equal to sixty-one natural days; in order therefore to maintain harmony between the numbers of the natural days and those of the tithis, a break in the counting of the tithis is made whenever two tithis terminate during one natural day, *i. e.*, according to the Súryaprajñapti on the occurrence of each sixty-second tithi. The details of this process are not stated in the Súryaprajñapti, but there can be no doubt that *mutatis mutandis* it was managed as it has been managed in India ever since. To give an example, the sixtieth natural day, counting from the beginning of the yuga, during which the sixtieth tithi terminated was counted as pañchadaśí (fifteenth tithi), the next following day as pratipad (first day of the new lunar half month) and then the day after that not as dvitíyá, second lunar day, but as ţritíyá third lunar day, the second lunar day having already terminated together with the preceding sixty-first natural day. These sixty-two lunar months are divided among five lunar years, the first, second and fourth of which comprise twelve lunations each, while the third and fifth count thirteen each. The technical name of years of the latter kind is abhivardhita-saṃvatsara, the increased year. The method according to which the two thirteenth months are intercalated in the yuga is not described in detail; it is however clear enough how it proceeded. The thirty-first lunation and again the sixty-second one were not counted, but formed together with the month immediately following a kind of double month taking its name from the second constituting member. Thus there is nominally no thirteenth month, and a proper name for the latter is therefore not required.

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* The question referred to in the text cannot be discussed here. The writer hopes shortly to find an occasion fully to treat it elsewhere.

Again the yuga consists of sixty-seven periodical lunar months, the moon during it returning sixty-seven times to the place from which she had started at the beginning. No attempt is made in the Súryaprajñapti to group these months into years nor are they subdivided into days of equal duration; they are simply said to comprise $27 \frac{21}{67}$ days each. They are, however, subdivided into two ayanas each, analogously to the division of the solar year into ayanas. This division is indeed legitimate enough as it is based on the alternate progress of the moon towards the north and south, about which details will be given later on. Less comprehensible is on the other hand the division of each periodical month into six lunar seasons, whose names answer to those of the solar seasons beginning with the rainy season; a division of this kind is of course utterly gratuitous and purposeless, and to us interesting only as a specimen of the Indian's excessive tendency to systematize.

If we now proceed to an examination of the account given in the Súryaprajñapti of the revolutions of sun and moon, we find at the outset that it differs from the statements made by Garga and in the Vedánga in one important point. According to the latter authorities (see Jyotisha-Vedánga, v. 6; this Journal for 1877, p. 415; Weber, Nakshatras II, pp. 28, 33), the yuga begins with the winter solstice, at the moment when it is new-moon, sun and moon being in conjunction in the beginning of the nakshatra Dhanishṭhá; according to the Súryaprajñapti the yuga begins with the summer solstice, at the moment when the moon is full in the beginning of Abhijit and the sun consequently stands in Pushya. The coincidence of the winter solstice with new moon marking, according to the Vedánga, the beginning of the yuga may of course actually have taken place at the time when the doctrine of the quinquennial yuga was first established and will have recurred later on from time to time; but it is evident that it could not regularly recur every fifth year. To this fact, however, as well as to the change which in consequence of the precession of the equinoxes gradually took place in the position of the sun at the time of the winter solstice, the eyes of the Hindus seem to have remained shut during a considerable period. Now it is curious to see that in this one point at least the author of the Súryaprajñapti who, on the whole, faithfully adheres to the old system and does not hesitate to take over the quinquennial yuga itself with all its glaring imperfections, considered himself entitled or obliged to deviate from the received tradition. For once the testimony of the eyes was placed above old authorities. In the first place, the winter solstice had so far receded from the beginning of Dhanishṭhá that the change could not be ignored; in the second place, it must have so happened that at the time of the author of the Súryaprajñapti no new moon took place together with the winter solstice, while—as we may presume—some full moon happened to coincide or nearly to coincide with some summer solstice. Accordingly the beginning of the yuga was changed. Faute de mieux the summer solstice coinciding with full moon was taken as the new starting-point, and the sun's place at the time was removed from the middle of Áśleshá which it had occupied in the old system to a point in Pushya. The moon's place at the time of the summer solstice, being separated from the sun's place by half the circumference, is then at the beginning of Abhijit; the latter point marks at the same time the sun's place at the time of the winter solstice.

The account given in the Súryaprajñapti of the position of the sun at the two solstices enables us to enter into a consideration of the approximate time at which either the work itself or some older work on which it may have been based was composed. The expression "approximate" is used on purpose as the general difficulties besetting an estimation of this kind referring to Indian astronomical works are well known, and as in our case special difficulties arise in addition to them. As will be seen later on, the Súryaprajñapti throughout employs twenty-eight nakshatras of unequal extent, while the Vedánga as well as the bulk of the later astronomical literature make use of twenty-seven nakshatras of equal extent. The relation of these two systems to each other necessitates a short excursus, for the starting-point of which we take a passage in Bháskara's Siddhánta Siromaṇi (Grahagaṇita, Spashṭádhikára, 71-74, p. 93 of Bápu Deva's edition) and a parallel passage from Brahmagupta's Sphuṭa-siddhánta. The former of the two, translated, runs as follows:

"This method of finding the Nakshatras which has thus been taught in a rough manner by the astronomers for the purposes of common life, I shall now teach in an accurate form as it has been proclaimed by the ṛishis for the purpose of processions, marriages, etc. The experts have declared six (nakshatras) to have one portion and a half, *viz.*, Viśákhá, Punarvasu and the (four) nakshatras called dhruva; six to have half a portion, *viz.*, the constellations presided over by the Sarpas, Rudra, Váyu, Yama, Indra, Varuṇa; the remaining fifteen to have one portion each. The portion of one nakshatra is called the mean motion of the moon (during one ahorátra). The minutes of the circle lessened by the portions of all (the 27 mentioned) nakshatras are the portion of Abhijit, lying beyond the nakshatra of the Viśve Devas, etc." These statements are repeated in Bháskara's own commentary, the Vásaná, where the common names of the nakshatras (Viśákhá, Punarvasu, Rohiṇí, the three Uttaras ;—A'sleshá, A'rdrá, Svátí, Bharaṇí, Jyeshṭhá, S'atabhishaj) are given and where Puliśa, Vasishṭha, Garga and others are said to be the Ṛishis alluded to in the text. The rough mode of computation referred to in the beginning of the above quotation is the one contained in v. 67 of the same chapter and agrees with the rule given in the Súrya Siddhánta, II, 64. According to it, when we wish to find the place of sun or moon or one of the planets in the circle of the nakshatras, we have to divide the longitude of the heavenly body expressed in minutes by 800 ; the quotient then shows the number of nakshatras through which the planet has already passed, and the remainder the traversed part of the nakshatra in which it is at the time. This rule therefore bases on the assumption of twenty-seven nakshatras each of which extends over one twenty-seventh part of the circle. Now, according to Bháskara, the Ṛishis taught that whenever greater accuracy is required, the nakshatras have to be considered as being of unequal extent. In the first place only fifteen of them are to be regarded as having the average extent, while six exceed that amount by one half and six others remain below it by one half ; and in the second place the twenty-seven nakshatras are no longer to occupy the whole circle, but only that part of it which corresponds to twenty-seven times the mean daily motion of the moon, while the remaining part of the circle is assigned to a twenty-eighth nakshatra Abhijit. Bháskara's statements are manifestly founded on a passage met with in the 14th chapter of the Sphuṭa Brahmasiddhánta which gives the same details regarding the different extent of the nakshatras, and is introduced by the following verse—

पौलिशरोमकवासिष्ठसौरपैतामहेषु यत्प्रोक्तम् ।
नक्षत्रानयनं नार्यभटोक्तं तदुक्तिरतः ॥

"The calculation of the nakshatras, which has been taught in the Pauliśa, Romaka, Vásishṭha, Saura, Paitámaha Siddhántas, is not mentioned by A'ryabhaṭa ; I therefore proceed to explain it."

And later on—

अध्यर्धार्द्धक्षेत्राणि संहितास्वभिहितानि गर्गाद्यैः ।
यस्माद् बहूनि तस्मान्नार्यभटोक्तं तदानयनम् ॥

The explicit statement about number and extent of the nakshatras in the older period of Indian astronomy, which is contained in the two passages quoted from Brahmagupta and Bháskara, is of considerable interest. If the account given by these two writers is correct and there is no reason to doubt of that, it appears in the first place that the mere circumstance of only twenty-seven nakshatras being mentioned in some detached fragment of an astronomical work which we do not possess in its entirety, would not justify the conclusion of the author of the work having been acquainted with twenty-seven nakshatras only. Nay, even the author of a treatise like the Vedánga who throughout speaks of 27 nakshatras only may have done this simply because he meant his work to be an elementary one, unencumbered by the assumption of 28 nakshatras of unequal extent. In the second place the distinct statement that the old writers on astronomy made use of Abhijit solely when greater accuracy was aimed at, and that they then made its extent to correspond to the excess of a sidereal month above twenty-seven days, certainly seems to point to the conclusion that the introduction of Abhijit into the circle of the nakshatras was an afterthought, consequent on the improved knowledge of the length of the moon's periodical revolution. With regard to the books in which, according to Bháskara and Brahmagupta, the division of the sphere into 28 nakshatras of unequal extent was taught in addition to the simpler division into 27 equal nakshatras, we have to remark that the Súrya-siddhánta known to us contains no such statement; the Saura-siddhánta of Brahmagupta may have been a different work. We are unable to control the statement with regard to the Romaka, Pauliśa, Vásishṭha-Siddhántas. Of Garga, however, we know from quotations several passages bearing on the point in question: in the first place, the passage quoted by Bhaṭṭotpala (in his commentary an Varáha Mihira's Bṛihatsaṃhitá, IV, 7; see Weber, Nakshatras, I, p. 309), which corroborates Bháskara's statement regarding the different extent of the Nakshatras, is, however, silent about Abhijit. As the passage stands, it would lead us to infer that Garga divided the whole circle into twenty-seven parts, the extent of fifteen of which is equal to one, of six to one half and of six to one and a half. The quotation may, however, be incomplete, and at any rate we have Brahmagupta's and Bháskara's word for Abhijit having been acknowledged by Garga too. However this may be, that Garga, as a rule, introduced into his calculations neither Abhijit nor the inequality of the extent of the twenty-seven nakshatras, appears from the places which he assigns to the sun at the two solstices, *viz.*, at the beginning of Dhanishṭhá and the middle of Áśleshá; for if we calculate the place of the summer solstice by starting from the beginning of Dhanishṭhá and making use of the unequal extent of the nakshatras, we obtain as place of the summer solstice not the middle of Áśleshá but rather the end of it or the beginning of Maghá.

To return. The special difficulty by which we are met when attempting to compare the places assigned to the solstices in the Súryaprajñapti with the places which they occupy according to Garga and the Vedánga on one hand and the Siddhántas on the other hand, lies in the circumstance of our not knowing exactly how the two divisions of the sphere—the one into 27 nakshatras of equal extent, the other into 28 of unequal extent—were made to correspond with each other. If we suppose—and this seems the most likely supposition—that each of the 27 nakshatras was curtailed by the twenty-seventh part of the small portion assigned to Abhijit and that the reckoning started from the beginning of Abhijit, (which according to the system of the Súryaprajñapti is the first of the series, as at the beginning of the yuga it is in conjunction with the moon), we may hazard an hypothesis with regard to the time lying between the Vedánga and the Súryaprajñapti, or rather between the observations of the solstices recorded in the two works. According to the Vedánga the winter solstice takes place in the beginning of Dhanishṭhá, according to the Súryaprajñapti in the beginning of Abhijit (which is the place of the full moon on the day of the summer solstice at the beginning of the yuga, and consequently the place of the sun on the day of the winter solstice); the two places are therefore separated by the whole of S'ravaṇa and Abhijit. Having, according to the hypothesis stated above, reduced the extent of S'ravaṇa (= 13·°33) by the 27th part of the extent of Abhijit, which extent is equal to about 4·°12, we obtain for S'ravaṇa 13·°18; to this we add Abhijit = 4·°12; the sum *viz.*, 17·°3 indicates the extent of the displacement of the solstice during the intervening period. Allowing seventy-two years for 1° of precession, the length of this period would be about 1246 years. If we therefore knew the absolute date of the Vedánga we might state the approximate absolute date of the observation recorded in the Súryaprajñapti, on the supposition always of the manner in which the two divisions of the sphere have been adjusted to each other being the right one. But, as Professor Whitney has shown, it is scarcely possible to form any satisfactory conclusion with regard to the date of the Vedánga, and we therefore abstain from giving a positive opinion about the date of the Súryaprajñapti.

We now proceed to a detailed consideration of the hypothesis by which the author of the Súryaprajñapti tries to account for the appearances presented by the various motions of the heavenly bodies, beginning with the sun.

The three different motions of the sun which he endeavours to explain are firstly, the daily motion in consequence of which the sun seems to approach us from the East, passes through our field of vision and finally disappears in the West; secondly, the annual motion in consequence of which the sun seems to pass in the course of a year through the circle of the nakshatras, proceeding from the West towards the East; and thirdly the motion in declension according to which the sun ascends towards the north during one half of the year and descends towards the south during the other half. As in all systems which consider the daily motion of the sun to be real (not an appearance produced by the revolution of the earth round its axis), the annual motion of the sun through the circle of the nakshatras is said to be apparent only, and produced by the circumstance of the motion of the sun being somewhat slower than that of the nakshatras, so that he daily lags behind by a certain quantity which accumulated during a whole year amounts to an entire revolution. How the Súryaprajñapti supposes the first and third motions to take place will appear from the following.

It must be remembered at the outset that the general conception of the configuration of the world which we find in the Súryaprajñapti is the same as that known from the Puráṇas. The earth is considered to be an immense circular flat consisting of a number of concentric rings, called dvípas, separated from each other by ring-shaped oceans. In the centre of the earth stands Mount Meru; around it runs the first dvípa—Jambudvípa, the only one which will concern us in the following. It is surrounded by a circular ocean, the water of which is salt (the lavaṇa-samudra). The southern segment of the Jambudvípa is occupied by the Bháratavarsha, the northern segment by the Airávata-varsha; east and west of Mount Meru are the two portions of the Videha-varsha. Sun, moon and stars revolve round Mount Meru, in circles of different height above the Jambudvípa, the same heavenly body, however, always keeping the same height. The detailed features of these motions are now according to the Súryaprajñapti as follows.

The circumstance of the sun seeming during one half of the year to approach daily more and more the north, while during the other half he seems to descend towards the south is explained in the following manner. On the longest day of the year which at the beginning of the cycle coincides with the first day of the lunar month S'rávaṇa, the sun describes round the mountain Meru a circle, the diameter of which is 99,640 yojanas. The distance of the sun from the centre of Meru amounts therefore to 49,820 yojanas. On the next day the sun describes a circle concentric with the first, and having a diameter greater by $5\frac{35}{61}$ yojánas, so that the distance of the sun, from Mount Meru now amounts to $49{,}820 + 2\frac{48}{61}$ yojanas. In the same manner the diameter of the circle described by the sun increases by $5\frac{35}{61}$ on the third day, fourth day, etc., up to the day of the winter solstice, which according to the system is the 183rd day after the summer solstice. On this day the sun describes round Mount Meru a circle, the diameter of which is equal to 100,660 yojanas, so that his distance from Mount Meru amounts to 50,330 yojanas. Beginning from this day the solar circles contract again, by the same quantity daily by which they had expanded during the southern progress of the sun. During the 182 days intervening between the day of the winter solstice and the day of the following summer solstice the sun describes again the same 182 circles in which he had descended towards the south, only in reverse order, until, on the day of the second summer solstice, he has again reached the innermost circle, from which he had started a year ago. During the second year the same expanding and contracting of the solar circles repeats itself and so on. The fact of the sun seeming to ascend towards the north during one half of the year, while he seems to descend towards the south during the other half is therefore explained by the supposition that he approaches us during the former half, while he recedes from us during the latter half. The system does not assume that he actually ascends or descends; for all the circles described by him are at an equal height above the Jambudvípa; he only appears to us to stand lower at the winter solstice than he does at the summer solstice, because at the former period he has receded from us to the amount of five hundred and fifty yojanas. The exact localities too above which the sun describes his daily circles are defined. The innermost circle, *i. e.*, the circle nearest to Mount Meru, which the sun describes on the longest day, would, when projected upon the earth, be distant 180 yojanas from the outer margin of the Jambudvípa. The second circle approaches nearer to that margin, the third still nearer, and so on, until the circles of the sun are no longer above the Jambudvípa itself but above the salt ocean, the lavaṇoda, which surrounds the Jambudvípa. Finally on the shortest day of the year the sun describes a circle which, in projection, is distant 330 yojanas from the edge of the Jambudvípa. After that he again approaches the Jambudvípa, and on the next summer solstice he has again entered into it to the amount of 180 yojanas. The technical term by which this recurring progress of the sun towards the Jambudvípa and the salt ocean is denoted in the Súryaprajñápti, is उगाहइ or अवगाहति (-ते); the sun is said to merge himself, or to enter to a certain distance into the Jambudvípa or into the salt ocean accordingly as his circles are vertically above the land or the surrounding sea.

In connexion with the sun's motion in circles of different diameter, the Súryaprajñapti treats of the increase and decrease of the length of the day. As in the Jyotisha-Vedánga, the length of the day of the summer solstice is estimated at eighteen muhúrtas, that of the shortest day at twelve muhúrtas. The days between the two solstices are erroneously supposed to decrease or increase by a uniform quantity, which is easily found to be equal to $\frac{6}{183} = \frac{2}{61}$ of a muhúrta.

A number of opinions of other teachers agreeing with the theory stated above in its general features, but differing in the figures, are likewise given by the Súryaprajñapti.

Different opinions regarding the extent of the solar circles are given in I, 8 and, which comes to the same, different opinions about the distance of the two suns from each other in I, 4. According to this chapter there were six different opinions about the distance of the two suns from each other on the longest day when the sun—or the two suns—describe the innermost and smallest circle. According to some teachers, the distance of the two from each other, or in other words the diameter of the circle they describe amounts to 1,133 yojanas, according to others to 1,134 yojanas; according to others again to 1,135 yojanas. Most probably we have to combine with these statements the statements given in the next chapter (I, 5) regarding the different opinions prevailing on the extent to which the sun "immerges" himself into the Jambudvípa and into the salt ocean. There we read that, according to one opinion the sun moves on the longest day in a circle which projected on the Jambudvípa is distant 1,133 yojanas from the edge of the latter, while on the shortest day he describes a circle above the salt ocean at the distance of 1,133 yojanas from the Jambudvípa. According to the opinions of two other sets of teachers, the number of yojanas in both cases is 1,134 and 1,135. If we combine these measures with the measures of the diameter of the innermost solar circle given above (and the sameness of the figures seems to entitle us to do so, although this is by no means explicitly stated), we get for the diameter of the whole Jambudvípa 1,133 (= diameter of the innermost circle) + 2 × 1,133 (= distance of the innermost circle from the edge of the Jambudvípa on both sides), therefore altogether 3,399 yojanas; or, starting from the numbers 1,134 and 1,135, 3,402 or 3,405 yojanas. These are very moderate dimensions compared with the 100,000 yojanas, which length the author of the Súryaprajñapti himself attributes to the diameter of the Jambudvípa, and we shall not be mistaken in ascribing to opinions of this nature a considerably greater antiquity than to those represented by the Súryaprajñapti. Besides, there is another circumstance in favour of such a view. The Súryaprajñapti throughout makes use of the relation $\sqrt{10}$: 1 for calculating the circumference of a circle. Thus for instance the diameter of the Jambudvípa being 100,000 (yojanas), its circumference is said to amount to 316,227 yojanas 3 gavy. 128 dhan. 13¼ añg. But those teachers who stated the diameter of the innermost solar circle to amount to 1,133 or 1,134 or 1,135 yojanas stated at the same time that its circumference amounts to 3,399 or 3,402 or 3,405 yojanas, *i. e.*, they made use of the relation 3 : 1 for calculating the circumference of a circle from its diameter. The adoption of this very rough approximate value seems to point back to a comparatively ancient time.*

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* It seems that all Jaina books take 1 : $\sqrt{10}$ as expressing the relation of the diameter to the circumference. See for instance Bhagavatí Sútra II, 1. 45 (Weber, p. 264), where, however, some confusion seems to have crept into the figures. The old and simple relation 1 : 3 is found for instance in the Bhúmiparvan contained in the Bhíshmaparvan of the Mahábhárata. There the circumferences of the planets are

Three more opinions concerning the distance of the two suns from each other on the longest day are quoted. According to the first, one whole dvípa with the addition of the surrounding ocean intervenes between the two; according to the second two dvípas and two oceans; according to the third three dvípas and three oceans. The distance in yojanas is not given. Two more opinions concerning the extent to which the sun enters into the Jambudvípa are stated; according to some the sun enters on the longest day into half the Jambudvípa and on the shortest day into half the salt ocean; the distances in yojanas are not mentioned. And according to others the sun enters neither into the Jambudvípa nor into the salt ocean, but moves in the interval (apántarála) of the two; how we have to imagine this interval does not appear.

The eighth chapter of the first book contains a long exposition of the dimensions of the circles described by the sun. Four different dimensions are stated. Instead of simply giving the length of the diameter, the length and breadth (áyáma and vishkambha) are given; these two are of course equal in a circle. Then the circumference of the circle is given, according to the ratio $\sqrt{10} : 1$, and finally the "váhalya," the thickness of the circle, *i. e.*, the diameter of the space filled by the mass of the sun or more simply the diameter of the sun himself. This amounts according to the Súryaprajñapti to $\frac{48}{61}$ of a yojana. The diameter and the circumference of the circles are of course continually changing, the circle described on the longest day having the smallest dimensions and that described on the shortest day having the greatest. The dimensions of the small circle and the amount of the daily increase have been mentioned above; it is therefore not necessary to follow the Commentator into the very tedious calculation of the dimension of each daily circle. The opinions of three other teachers on the dimensions of the circles, according to which the diameter amounts to 1,133 yojanas etc., have already been mentioned; the thickness of the circle, *i. e.*, the diameter of the sun is held by them to amount to one yojana.

We turn now to the statements regarding the velocity with which the sun moves in his different circles, and among these at first to those made by the Súryaprajñapti itself. The calculation is a very simple one. Each daily circle being described by two suns, each of which travels through half of it in thirty muhúrtas, the whole circle is described by one sun in sixty muhúrtas, and consequently we have, in order to find the velocity of the sun, to divide the periphery of the daily circle by sixty; the quotient is the number of yojanas travelled through by the sun in one muhúrta. Thus the sun, when travelling in the smallest innermost circle, the circumference

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stated in numbers which are the threefold of the numbers expressing the diameters: चन्द्रमास्तु सहस्राणि योजनैकादश स्मृतः । विष्कम्भेण कुरुश्चेह त्रयस्त्रिंशत्तु मण्डलम् etc.

of which is 315,089 yojanas long, passes in one muhúrta through 5,251 $\frac{29}{60}$ yojanas. On the following day both suns travel in the second circle which is somewhat larger than the first one, and consequently the suns having to describe a larger space in the same time, *i. e.*, during the duration of a nycthemeron travel somewhat faster, pass in one muhúrta through 5,251 $\frac{47}{61}$ yojanas. Thus day after day the speed of the two suns is increasing in accordance with the continually increasing extent of the diurnal circles, until on the day of the winter solstice both suns travelling in the outmost circle pass through 5,305 $\frac{15}{60}$ yojanas in one muhúrta. Beginning from this day their speed diminishes as they are again approaching the innermost circle, until on the day of the next summer solstice their rate of speed is again at its minimum. In connexion with this discussion of the swiftness of the sun, the Súryaprajñapti treats of the question of the distance from which the light of the sun becomes visible to the inhabitants of the Bharata-varsha. By this distance we have, however, to understand not the distance of the sun from the Bharata-varsha in a straight line, but rather that part of the sun's daily circle which lies between the point of the sun's rising and the meridian. It is well known, says the Commentator, that the sun becomes visible to the eye of man at a distance equal to half of the extent (kshetra) over which he travels during the whole day, *i. e.*, at the time of his rising, his distance from us (=from our meridian, although this is not expressly stated in the Súryaprajñapti) is half of the arc which he describes during the whole day. The length of this arc has to be measured simply by the time which the sun takes to travel through it. Thus, for instance, on the longest day the sun is visible to the inhabitants of the Bharata-varsha during eighteen muhúrtas out of thirty; from the moment of his rising he will therefore take nine muhúrtas to come up to the point straight in front of us (to the meridian). Now we have seen before that on the longest day the sun travels over 5,251 $\frac{29}{60}$ yojanas in one muhúrta; consequently he travels in nine muhúrtas over 47,263 $\frac{21}{60}$ yojanas. This therefore is the distance—expressed as an arc of the diurnal circle—at which he becomes visible to the eye of man. On the shortest day on the other hand the sun is visible for twelve muhúrtas only; we have therefore to multiply the amount of his motion in one muhúrta by six in order to find the distance at which he first appears to the eye of man on that day.

Regarding the swiftness of the sun four other opinions are recorded by the author of the Súryaprajñapti. According to some teachers, the sun travels in one muhúrta over six thousand yojanas, and as far as it appears this rate of motion is the same in whatever circle the sun is moving. How these teachers accounted for the fact of the sun taking the same time to travel through a large circle as through a small one is not explained. The amount of space illuminated on each day (the tápakshetra), expressed as arc of the diurnal circle of the sun, they calculated in the same manner as the author of the Súryaprajñapti, *viz.*, by multiplying the amount of motion in one muhúrta by the number of the muhúrtas of the day. Thus the tápakshetra on the longest day would amount to 108,000 yojanas, that on the shortest day to 72,000 yojanas. According to the opinions of two other schools, the motion of the sun in one muhúrta amounts to 5,000 yojanas or 4,000 yojanas. Here too nothing is said about any variation in the sun's speed at different times of the year. The tápakshetra is calculated in the manner stated above. The last opinion mentioned is that of some teachers who held the rate of speed of the sun to be different during different periods of the day. According to them, the sun passes over six thousand yojanas in the muhúrta after his rising and in the muhúrta preceding his setting, over four thousand yojanas during the muhúrta in the middle of the day and over five thousand yojanas in all other muhúrtas.

The various opinions prevailing with regard to the rising and setting of the sun are detailed in the first chapter of the second book. The opinion of the author clearly appears from what has already been stated. There is no real sunrise or sunset; the sun or rather the two suns revolving round Mount Meru appear to rise to the inhabitants of some particular place at the moment when they enter their field of vision, and they appear to set when they leave it. In reality they always move above the Jambudvípa at the same height, estimated by the Súryaprajñapti to amount to eight hundred yojaṇas. At the beginning of the yuga at sunrise on the first of S'rávaṇa the Bhárata sun becomes visible to the Bhárata-varsha having reached the south-east point of his diurnal circle; diametrically opposite to it, *viz.*, in the north-west point of the same circle the Airávata sun appears to rise to the inhabitants of the tracts north of Mount Meru. During the course of this day the Bhárata sun therefore illuminates the countries to the south; the Airávata sun those to the north of Meru. At the time of sunset the Bhárata sun having passed through the southern segment of his circle disappears from the view of the people south of Meru and enters the view of those west of Meru; these latter therefore have their day while it is night in Bhárata-varsha. At the same time the Airávata sun appears to have set to the people north of Meru and to have risen to those east of Meru. On the second day the Bhárata sun rises to the countries north of Meru and the Airávata sun to the Bhárata-varsha. On the third morning the Bhárata sun has completed a full circle and therefore again rises to the Bhárata-varsha while the Airávata sun again rises to the regions north of Meru. And so on *ad infinitum.* We may recall here a parallel passage from the Vishṇupuráṇa (II, 8), tending to illustrate how sunrise and sunset were conceived to take place on the hypothesis of the sun (the Puráṇas know of one sun only) moving round Meru. "The sun is stationed at all times in the middle of the day (*i. e.*, it is always midday at that place above which the sun is) and over against midnight in all dvípas. In the same manner rising and setting are at all times opposite to each other in all the cardinal and intermediate points. When the sun becomes visible to any people, to them he is said to rise, and wherever he disappears from the view there his setting is said to take place. Of the sun which is always (above the earth) there is neither setting nor rising; his appearance and disappearance are called his setting and rising."*

The Súryaprajñapti adds an interesting account of other views regarding the sideway-motion (tiryag-gati) of the sun. According to some the sun is not a divinity, but only a mass of rays which in the morning form themselves in the East into a globular shape, pass sideways along this visible world, and in the evening dissolve again in the West. This process repeats itself daily. According to others the sun is the well-known divinity; but each morning he is born anew according to his nature in the ether in the East (svabhávád ákáśa utpadyate), passes along this world and dissolves (vidhvaṃsate) at evening in the ether in the West. According to others the sun is the mighty everlasting god known from the Puráṇas; in the morning he rises in the East, passes over this world, and at evening sets in the West; from thence he returns below to the East, illuminating the parts below. This—the commentator says—is the opinion of those who hold the earth to be a globe; it finds great favour at present among the tírthántaríyas and is thoroughly to be studied in their Puráṇas. This opinion has three sub-divisions. Some say the sun returning at daybreak from the parts below rises in the ether (ákáśe) and sets in the ether; others say he rises or originates (uttishṭhati utpadyate) in the morning on the summit of the mountain of rising (udaya-bhúdhara-śirasi) and perishes (? vidhvaṃsate) in the evening on the summit of the mountain of setting (astamaya-bhúdhara-śirasi); this repeats itself daily. (But, if he "utpadyate" and "vidhvaṃsate," how can he pass under the earth during the night?). Others say he rises in the morning on the mountain of rising and enters in the evening into the mountain of setting, illuminates during the night the subterraneous world and rises again from the mountain of rising. Others say, he rises, that is, originates from the eastern ocean in the morning, perishes at evening in the western ocean (same objection as above); others again, he rises from the eastern ocean, enters at evening into the western ocean, passes during the night through the subterraneous world, rises again from the eastern ocean. The last opinion mentioned is not very clear and an account of it is therefore not given in this place.

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* Mr. Fitz-Edward Hall (Wilson's Vishṇu Puráṇa, Vol. II, p. 242) directs our attention to the "heliocentricism" taught in this passage. But clearly there is no trace of heliocentricism to be found in it. He apparently is misled by the words अर्कस्य सर्वतः सतः which he translates "of the sun which is always in one and the same place." But this translation is quite untenable, since the Vishṇu Puráṇa most unambiguously teaches the sun's revolution round Mount Meru.

The third and fourth books contain particulars about the tápakshetra, *i. e.*, that part of the Jambudvípa which on each day is illuminated by the sun or rather by the two suns. The shape of this tápakshetra the Súryaprajñapti compares to that of a kalambuká-flower turned upwards, a comparison which has to be understood in the following manner. Each of the two suns illuminates a sector of the large circle formed by the Jambudvípa. These sectors are, however, not complete, but a piece is cut off from each by Mount Meru which standing in the middle of the circle repels by its own superior radiancy the rays proceeding from the two suns and therefore is not included in the tápakshetra. The interior border of the sectors is thus formed by a part of the circumference of Mount Meru, their outward border by a part of the circumference of the Jambudvípa. Between these two sectors of light there lie two sectors of shade (andhakára); whatever part of the Jambudvípa is covered by the two former enjoys day at the time while it is night in the regions covered by the dark sectors. As the two suns revolve these four sectors revolve with them, sweeping over the whole extent of the Jambudvípa and producing alternate day and night in all its parts. The relative magnitudes of the tápakshetra during the different parts of the year is estimated in accordance with the statements about the relative length of night and day. On the longest day the two suns, moving in the innermost circle, together illuminate three-fifths of the Jambudvípa, each of them three-tenths; on the shortest day they illuminate two-tenths each, together two-fifths. On the day after the summer solstice when the suns have entered into the second circle, and are moving at a greater distance from the centre, the extent of the tápakshetra decreases accordingly, so that it then equals $\frac{3}{5} - \frac{1}{5 \times 183} = \frac{3}{5} - \frac{1}{915}$ of the whole Jambudvípa only; the same decrease repeats itself daily up to the day of the winter solstice when the extent of the illuminated portion of the Jambudvípa has reached the minimum stated above. From that period it again begins to increase by the same portion daily. From this the absolute dimensions of the tápakshetra or, to express it more conveniently, of one of the two sectors composing the tápakshetra are easily derived. The two straight lines by which it is limited are equal in length to the radius of the Jambudvípa less the radius of Mount Meru (50,000 — 5,000 = 45,000 yojanas). To this we find in one passage of the Súryaprajñapti added the sixth part of the breadth of the salt ocean surrounding the Jambudvípa, up to the end of which the light of the sun seems to reach, on the longest day at least; this gives altogether $78{,}333\frac{1}{3}$ yojánas $\left(= 45{,}000 + \frac{200{,}000}{6}\right)$. In the statements regarding the measure of the two arcs limiting the sector, no reference is made to the salt ocean. We find these measures for the longest day by dividing the circumference of Mount Meru as well as that of the Jambudvípa by ten; three of these ten parts of the first kind give the interior arc of the truncated sector, three of the second kind the exterior arc. On the shortest day we have to take two-tenths instead of three, and there is no difficulty in finding the corresponding increase or decrease on all days between the summer and winter solstice. In the same manner the dimensions of the andhakára, the dark portion of the Jambudvípa, are readily ascertained. Finally some statements are made about the distances to which the light of the two suns reaches above, below and towards both sides. It is said to reach to a thousand yojanas above (above the chariot of the sun, svavimánád úrdhvam). Further it is said to reach down to the depth of 1,800 yojanas, for which the following explanation is given. The sun is at the height of 800 yojanas above the earth, and below the surface of the earth at the depth of 1,000 yojanas are the subterraneous regions (adholaukikagrámáḥ), down to which the sun's rays are penetrating. No further details about these subterraneous dwellings are given. Towards both sides, the east and the west, the light of the sun is said to extend to the distance of $47{,}263\ \frac{21}{60}$ yojanas.

For the sake of completeness, the various other opinions with regard to the subjects treated in the last paragraphs are added. Some say that the sun and moon illuminate one dvípa and one ocean; while according to others the numbers of dvípas and oceans illuminated are 3, $3\frac{1}{2}$, 7, 10, 12, 42, 72, 142, 172, 1042, 1072. No details are given. One chapter contains the enumeration of a number of very fanciful opinions about the form of the tápakshetra, which it would, however, be purposeless to extract in this place.

On the assumption that the sun describes every day a circle which is at the distance of $2\ \frac{48}{61}$ yojanas from the circle described on the preceding day, the question naturally suggested itself, how the sun passes over from one circle into the next one. This question is treated in I, 6, and II, 2 where two different opinions are expounded which, although the account given of them is not altogether clear, appear to be of the following nature. According to some the sun enters from one circle into the other, "bhedaghátena" which (bheda being explained to signify apántarála) seems to mean that the sun passes from one circle into the next one by moving over the distance separating the two all at once. Thus the sun would really move in perfect circles and the motion across from one circle into the other would be a momentary one only. The other opinion, and to this the Súryaprajñapti seems to adhere, is that the sun does not in reality move in separate perfect circles, but rather in an uninterrupted spiral line. As the Súryaprajñapti expresses it, the sun begins from the moment he has entered the first circle to move "śanaiḥ śanaiḥ" across towards the second circle, and as soon as he has reached the second circle, he begins to move towards the third circle, etc. The term "karṇa" which occurs in this description of the sun's motion seems to denote the spiral line which passing across the whole room between the two circles connects the two; a line which might properly enough be called "karṇa," *i. e.*, diagonal. On this hypothesis then we should have to remember that the sun is only for convenience sake said to describe a separate circle on each day, and that in reality he is supposed to describe a continuous spiral line.

After having thus given a succinct account of the Súryaprajñapti's theory concerning the motion of the sun, we now proceed to consider the statements referring to the motion of the moon.

(To be continued.)

Memorandum on Clay Discs called "Spindle Whorls" and votive Seals found at Sankisa, Behar, and other Buddhist ruins in the North Western Provinces of India.—By H. RIVETT-CARNAC, ESQ., C. S., C. I. E., F. S. A. (With three Plates.)

Last year I submitted for the inspection of the Asiatic Society specimens of stone and clay discs, similar to what are called "spindle whorls" by the Antiquaries of Europe, found by me at the Buddhist ruins of Sankisa, Behar, &c. in the Fatehgaṛh District, N. W. Provinces of India. Certain clay seals stamped with the Buddhist formula found in the same localities were also exhibited. The resemblance between these "spindle whorls" and those described and figured by Dr. Schliemann in his work "Troy and its Remains" was briefly noticed by me at the time. Since then I have obtained some more specimens of these discs and seals, and I think it well that they should be submitted for the inspection of the Asiatic Society, and that the attention of its Members and of other Antiquaries should be directed to the resemblance to be traced between these remains and those found in the ruins of Hissarlik and in many parts of Europe.

First as regards so called "spindle whorls." When we were encamped at Kanouj, Sankisa and Behar Khas in the Fategarh district, the village urchins were encouraged to bring to us everything in the shape of "Antiquities" that could be grubbed out from these extensive ruins and from neighbouring mounds. These sites, as is well known, present many features of resemblance to those which Dr. Schliemann dug through at Hissarlik, described at length in his work upon Troy. That is to say, it is generally found in the case above-mentioned that the site has been selected on account of some Kunker Hill which, rising out of the flat alluvial soil of the Doab, offers a point of vantage for the building of a fort or city. Here, as at Hissarlik, these sites often bear the traces of several distinct colonies. The mud buildings of one set of colonists have been razed by their conquerors or successors to build thereon houses and temples which have again been levelled to form the foundations of the habitations of later settlers. The high mounds, on which part of the present town of Kanouj is perched, is to be accounted for in this way, and there can be little doubt that if shafts were to be carried through the ruins there, after the manner adopted by Dr. Schliemann at Hissarlik, the traces of several distinct periods might be unearthed. What has been said of Kanouj holds good in regard to Sankisa, Ramnuggur and other ruins. Much has not yet been done to explore these localities, and the recent interesting find of Mitra coins, reported by me to the Society, indicates that careful investigation might prove remunerative to antiquarian research. The heavy rains of India are, however, of much assistance in running amateur sections through the ruins, and in exposing from time to time relics of more or less interest. Amongst these may be classed the "spindle whorls" now to be noticed, many of which together with coins, beads, etc. are collected and set aside by the villagers as possessing some mysterious significance, and are brought out for sale when the District Officer or some occasional visitor camps near the place.

Of these clay discs and their stone prototypes four distinct classes are to be noticed:

A. Terra Cotta Discs, plain and ornamented.

B. Ditto with a hole through the centre.

C. Terra Cottas "in the form of a top and the crater of a volcano" (I use the words of Dr. Schliemann, Troy, p. 38 to describe these peculiar specimens).

D. Clay Balls, plain and ornamented.

With respect to A, Clay or Terra Cotta discs, these were brought to us in enormous quantities, and, if disposed to do so, we might have purchased and carried off several elephant loads of this description of relic. At the time I did not attach much importance to them, and am sorry now that no careful selection was made of those bearing different styles of ornamentation. They are all of red or black clay well baked. In size they vary from 1 inch to 2 inches in diameter and are about ¼ of an inch in thickness. The majority of them bear a rough ornamentation at the edges only, see Plate XIII, sketches 1 and 2. Others again show traces of more elaborate design and workmanship. Some of these are figured in sketches 3 to 7.

On one, No. 5 of my sketch, will be seen the broad arrow noticeable on Schliemann's No. 458. On another, No. 6, is what looks like the sign of Saturn or what Dr. Schliemann calls the "mystic rose," well known on Buddhist coins and in Buddhist art. They all have more or less ornamentation at the edges, resembling the spokes of a wheel or possibly the rays of the sun.

I also obtained at Sankisa several stone discs of nearly the same shape as the Terra Cottas. They are all highly polished. One is of black marble, another of crystal. Several are of red marble, and the material must have been brought from a distance, as no stone save kunkur is to be found within many miles of Sankisa. It will be noticed that all these stone specimens are grooved at the edges, see the section in sketch No. 8, whereas but few of the clay specimens have received such treatment.

Type B, sketch No. 9, on Plate XIV consists of clay discs similar in most respects to the foregoing, save that a hole has been drilled through the centre of each. I did not pay any particular attention to the proportion in which these different classes were brought to me in camp. But I find that I have many more of the plain discs than of those which have been pierced. There can be little doubt, however, that many hundreds of the pierced ones might have been obtained on the spot, and I am sending to ascertain whether any more ornamented specimens are procurable. The specimen marked and figured in sketch No. 10 is of grey granite. It bears the same relation to the pierced clay discs as the stone and crystal discs mentioned above bear to the clay whorls of type A. In the centre is a hole, round which are six concentric circles.

The specimen figured in sketch No. 11, is of a somewhat different type from the foregoing, as a section of the sketch will explain. The impressions of the spokes of a wheel with dots between each spoke appear to have been made in a stamp or mould. I find I have only two of this class in my collection. But doubtless hundreds more might have been obtained had I not been afraid of burdening myself during the march with too large a collection of such specimens.

Of type C, Sketches Nos. 12 and 13, on Plate XIV, which may be described in Dr. Schliemann's words as being in the form of a "top or crater of a volcano" I have, I find, but 4 or 5 specimens; I have little doubt that large numbers were offered to me, but at the time they did not appear to possess any particular significance. It was only in tumbling out a large number of discs from the box, in which they had long been kept, that I recognised this type of the illustrations of Dr. Schliemann's book, just consulted with reference to the Discs A and B mentioned above. The specimens I have with me do not bear any marks of ornamentation. Further search may perhaps bring better specimens to light. (Since this was written some ornamented ones have been found.)

Lastly we have type D, Clay Balls, Plate XIV, sketches Nos. 14, 15, 16, resembling somewhat those figured by Dr. Schliemann. Several of them are roughly ornamented, and the designs, such as they are, will be seen from the sketches.

I hardly know how it happened that these specimens were carried away by me. Certainly no importance was attached to them at the time; and they would have escaped my notice altogether, had I not seen, when comparing the clay discs, the sketches of somewhat similar balls figured in the last pages of Dr. Schliemann's book.

Lastly, I have also figured two specimens Nos. 17 and 18 which seem to approach type C. And an enamelled glass bead No. 19.

This bead is similar to that figured in Thomas' Prinsep, Pl. IV, No. 13. These beads are found in large quantities together with crystal, onyx cornelian and others at Sankisa and similar ruins. It seems desirable to figure the specimen with this paper in order to ascertain whether similar ones are found in Europe or elsewhere. The village urchins during the rains make a practice of collecting these beads, and they are usually given to *fakirs* or devotees. Seeing such a necklace worn by an old *fakir* led me to enquire whence the beads came. And I had little difficulty in procuring a variety sufficient for about nine necklaces.

I have now to direct attention to the resemblance between the specimens above described and figured, and those discovered by Dr. Schliemann at Hissarlik and noticed at great length and figured in large numbers in his well known work upon Troy.

As regards type A, clay discs more or less ornamented, without the central hole, I cannot be quite certain that this type was found by Dr. Schliemann. I do not see that any distinct mention is made of unpierced discs, and it is not quite clear from the sketches in Dr. Schliemann's work, whether, what is referred to as the Central Sun on the Discs figured in plates 22 and 23, is a hole drilled through the centre or is a depression or ornamentation representing the sun. Still, even if this particular type was not found at Hissarlik, it is found in Italy, and, as will be shewn further on, the resemblance between the remains found at Hissarlik and those of Italy is referred to by Dr. Schliemann.

Dr. Schliemann writing of his discoveries at page 187 of his work above quoted, thus refers to the discs:

"During the last few days we have also found, in the strata next above the primary soil, at a depth of from 46 to 36 feet, a number of round brilliant black terra cottas of exquisite workmanship; most of them much flatter than those occurring in the higher strata and resembling a wheel; many are in the shape of large flat buttons. But we also meet with some in the form of tops and volcanoes which differ from those found in the higher strata only by the fineness of the terra cotta and by their better workmanship. The decorations on these very ancient articles are, however, generally much simpler than those met with above a depth of 10 meters (33 feet) and are mostly confined to the representation of the sun with its rays, or with stars between the latter, or of the sun in the centre of a simple cross, or in the middle of four or five double or treble rising suns. At a depth of 6 meters (20 feet) we again found a round Terra Cotta in the form of a volcano, upon which are engraved three antelopes in the circle round the sun

"At a depth of from 5 to 8 meters (16½ to 26 feet) a number of terra cotta balls were found, the surface of each being divided into eight fields; these contain a great many small suns and stars, either enclosed by circles or standing alone. Most of the balls, however, are without divisions and covered with stars; upon some I find the swastica and the tree of life, which, as already said, upon a terra cotta ball found at a depth of 26 feet, had stars between its branches." (Schliemann's Troy, p. 187.)

The above extract embraces not only the so-called spindle whorls, but mentions the volcano-shaped "whorls" of type C found at Sankisa and type D brought away by me from the same place. The discs were found by Dr. Schliemann of terra cotta, of marble and of crystal. So at Sankisa did we find clay, marble and crystal discs.

A comparison of the Plates appended to Dr. Schliemann's volume with the specimens submitted by me and the sketches which accompany this paper will, I think, shew that there is at least some resemblance between the remains found at Hissarlik and those at Sankisa.

On nearly all these discs will be seen what are constantly referred to as the spokes of the wheel or the rays of the sun. I have placed side by side with my sketches a copy of the whorl engraved by Dr. Schliemann at page 137. It might fairly be taken to be a representation of the whorl given in Plate XIV, Sketch 10 appended to this paper.

Then my collection is unfortunately in no way large or complete. When at Sankisa, I had little idea of the significance of these remains or their resemblance to well known types, and I only purchased a few of them in the manner that I collect everything that seems to be unusual or strange. Further search may possibly bring out even more remarkable points. The few specimens that I have succeeded in obtaining bear, however, a resemblance, not only in shape, but also in ornamentation, to those figured by Dr. Schliemann, sufficient to render the subject interesting. The broad arrow of my Sketch No. 5 and the Mystic Rose or sign of Saturn, or the numeral four of my Sketch No. 6, are all to be traced among Dr. Schliemann's specimens; and then again on the balls some similarity in ornamentation is to be traced.

It would perhaps hardly be right to attach much importance to the fact, that one or two clay discs were found in Buddhist remains in India, and that discs of somewhat the same type were unearthed at Hissarlik. But here we have, not only pierced discs of type B, but the Volcanoes C and the Balls D, all three types resembling in some degree the three types of Hissarlik and all three types bearing somewhat similar forms of ornamentation.

Again it is to be noticed that the remains at Sankisa are undoubtedly Buddhist. Sankisa as is well known was a celebrated place of pilgrimage, being sacred as the spot at which Buddha is supposed (as described by General Cunningham, Vol. I, Archæological Reports) "to have descended from the Trayastrinsa heaven by the ladder of gold or gems, accompanied by the gods Brahmá and Indra."

The place was visited and described by the Chinese pilgrim Fa Hian early in the 5th century, and by Hiouen-Thsang in the 7th century A. D. A detailed account of these interesting ruins will be found in General Cunningham's Archæological Report above alluded to.

Now the ornamentations on the Terra Cottas of Hissarlik, if they are not Buddhist, certainly bear a close resemblance to the ornamentations on coins, buildings, etc., which in India are generally supposed to be Buddhist.

Thus the wheel continually recurs in Schliemann's sketches, together with the Swastika. And what Schliemann calls the Mystic Rose, and Fergusson the Trisul ornament is quite as frequent. The Sacred Tree, the Fire Altar and the Deer are also almost as common. In fact, we have every one of the Buddhist symbols of the well known type of the so-called Buddhist coin, figured in No. 1, Plate IV, Thomas' Prinsep, and of which an engraving is given at page 17 of Fergusson's Indian and Eastern Architecture. Mr. Fergusson points out, however, that there is some doubt whether these symbols really are Buddhist, and at the page above referred to, writes, "One coin of the period is well known. It belongs to a king called Kunanda or Krananda generally assumed to be one of the nine Nandas with whom this dynasty closed. In the centre on one side, is a dagoba with the usual Buddhist Trisul emblem over it, and a serpent below it: on the right the sacred Tree, on the left the Swastika with an altar (?) on the other side a lady with a lotus (Sri ?) with an animal usually called a deer, but from its tail more probably a horse, with two serpents standing on their tails over its head which have been mistaken for horns. Over the animal is an altar, with an umbrella over it. In fact a complete epitome of emblems known on the monuments of the period, but savouring much more of Tree and Serpent worship than of Buddhism as it is now."

Dr. Schliemann at page 38 of his work refers to the resemblance between the Terra-Cottas of Hissarlik and those of Italy. This directed my attention to Gastaldi's work. The following extract will show that if it be considered that the resemblance between the remains at Sankisa and Hissarlik is not established, such doubt can hardly exist regarding the Indian and Italian remains.

Gastaldi says: " There are very many of these objects, for the greater part of Terra-Cotta, more or less discoidal, or conical, or spheroidal, pierced in the centre, to which the Archæologists of France and Germany, as well as our own, have given the name of spindle-whorls. The paste of the spindle-whorls is not, for the most part equal to that of earthenware; instead of the grains of sand, we find powdered carbon and ashes; the colour is ashy in the internal parts, and ash colour varying into yellow and red on the outside. Some few spindle-whorls are black, and of a substance probably similar to the thinner vases, and, like a great number of these, are shining externally as if with varnish. They are very various in form; and although eight different ones have been represented by you, from those which, in the course of the summer, we sent from Campeggine, courteously presented by the brothers Cocconi, not one represents the other six, collected in the sequel, in the marl-beds. Some few bear marks scratched upon them, and are among those you have had engraved (Fig. 25).

" Besides all the spindle-whorls of earth, there were dug up from the marl-beds of Castellazzo di Tontanellato, three others, which are cut out of different substances. One was made out of a stag's horn, it is in the shape of a cone, and is very highly polished; the second of stratite, of a greenish tint, and spheroidal; the third, of a whitish limestone (calcare), is disc-shaped, brought to a high degree of polish, and certainly manifests an advanced epoch in art among the people who used such implements. Among the objects in the Museum of Antiquities at Parma, which are of uncertain derivation, there are twenty spindle-whorls, some in limestone, stratite, and even amber, but the greater part of earth; some are polished, some are ornamented with circles, concentric with hole pierced in them, or in concentric lines disposed in groups on the back of the spindle-whorl. We find among these the transition from the more depressed discoidal form, almost medallion (nummulik) to the acute conical. Some one of those in terra cotta is said to have been collected from the ruins of the Roman City of Velicia. The different forms, finish and substances of the spindle-whorls would lead us to suppose that they must have served for various uses in proportion to their diversity; perhaps the most beautiful and carefully worked were amulets, or else buttons; the others weights, used either for nets or in weaving."

" Besides all the earthenware and all the spindle-whorls which we have spoken of, we meet in the marl-beds with other small objects in earth, badly baked, in form disc-shaped, without any hole, sometimes ball-shaped (pallottola), of which it is impossible to divine the use which they served."

(Lake Habitations and Prehistoric Remains in Northern and Central Italy. B. Gastaldi, pp. 44, 45, 46, 47.)

In Italy these mysterious articles are found of clay and marble, as in India. The ornamentation is the same and in Italy also are found the disc-shaped Terra Cottas *without any hole* similar to those of North Western India. It is hardly necessary to burden this paper with any more sketches. The Italian remains are almost exactly the same as those of Schliemann, but I cannot resist the temptation of copying the specimen marked 8 B which will be found figured at p. 45 of Gastaldi's work. It is almost identical with No. 12 of those figured by me.

Next as to the use to which these remains were placed. Dr. Schliemann discusses the subject at length in several places in his valuable work on Troy. And it will be seen that Gastaldi is puzzled as to their significance. Dr. Schliemann arrives at the conclusion that, although some of them may have been used as spindle-whorls, the greater number of them were votive offerings. And Gastaldi considers that some at least were amulets. The symbols on most of those found at Hissarlik would seem to leave little doubt of their religious character. Of the Indian specimens, it is not easy to say why some should have the central hole and others should be unpierced. But, if they are votive offerings, the fact that the pierced ones were found in smaller quantities at Sankisa than those without the hole, may possibly be explained by a practice, which was noticed by me years ago at some shrines of pilgrimage in the Central Provinces. There the pilgrim, when he makes a vow or implores a favour, smeares his right hand with red colouring matter, and impresses it, fingers upwards, on the wall of the temple, leaving there a mark like the Red Hand of Ulster. If the favour, the birth of a child or whatever it may be, is granted by the presiding deity, the pilgrim is supposed to return to the shrine the following year, and to impress on the wall a similar mark, the fingers of the hand this time pointing downwards. It was very noticeable that the latter marks were well in the minority, and it was carefully explained by the local priests that this was not to be accounted for by the supposition that the deity was slow in his favours, but that, in truth, the suppliants, when they had obtained what they wanted, were not always mindful to return and to fulfil their vows. Perhaps in this way the proportion of the unpierced to pierced discs may be explained. The unpierced ones being offered when a favour was implored, the pierced ones when it was obtained.

Be this as it may, the view that these discs are votive offerings is supported by the religious character of the symbols, already alluded to, found on the whorls of Hissarlik and Sankisa. Since I commenced to write this paper, I have received a copy of Alabaster's "Wheel of the Law." At Fig. 8 A will be found a copy of the sketch of the Buddhist wheel of the law given in that work. And it is almost unnecessary to point out the resemblance which the highly ornamented Disc No. 7 bears to this sketch. The other discs, though not so elaborately ornamented, seem to adopt the same idea. No. 11, as far as ornamentation is concerned, undoubtedly resembles a wheel, though, as the section will show, it can never have been used, as some of my friends have suggested, as the wheel of a toy cart; nor indeed are there any marks of wear on any of the wheel-shaped discs to support the view that they were used for miniature playthings of this description. It seems much more probable that they were votive offerings intended to represent, more or less the Buddhist wheel of the law, similar to that stamped on some of the coins recently submitted by me to the Society.

The view that these were indeed votive offerings, and not toy cart wheels or *pachísi* or draughtsmen, as some have suggested, is further borne out by the large numbers of clay discs, of a somewhat similar type, but bearing on them the well known Buddhist formula, found in the same neighbourhood. These seals, as they have sometimes been called, from their bearing a seal-like impress, have been figured by Moor in his Hindu Pantheon and have been described by General Cunningham, by Dr. Rajendralála Mitra, C. I. E. and others. General Cunningham, if I remember right, found large quantities of such "seals" made of lac in the Buddhist ruins of Behar. Though my stay at Sankisa was short, I succeeded in obtaining a considerable number of these seals. Many of them are from the same stamp. Others from different moulds bear the same well known formula commencing "*ye dharma hetavo.*" The character of the legend in all these cases is comparatively modern. Those, however, marked 1 and 2 Plate XV bear the formula in the Gupta character. Others again marked 3 to 6 are deserving of notice from the variety of their ornamentation. They would seem all to have been made and stamped, in what I may call, a cushion-like fashion, after the manner of the quaintly-shaped Mitra coins recently submitted by me to the Society. Some of these seals are I think worthy of being figured in the Society's Journal.

There can be little doubt that these so-called seals, bearing the Buddhist formula, are votive offerings. A friend of mine, Mrs. Murray-Aynsley who recently travelled through a portion of Ladakh, brought me thence two stones, one inscribed with a portion of the Buddhist Formula, Plate XV, No. 7, the other bearing a conventional ornamentation. That these stones are offered in the present day, will be seen from the following extract from Mrs. Murray-Aynsley's work entitled "Our Visit to Hindostan, Kashmir and Ladakh," p. 88.

"We there first saw some of the walls called Mánés, which are formed of stones placed one upon the other without any mortar, and are usually about four feet high, and four feet wide. Some of these walls are as much as a quarter of a mile in length, and are made, we were informed, with the following object. When a Buddhist undertakes a journey, or makes a vow, he chooses a flat stone, takes it to a monastery, and gets a lama (or monk) to engrave some rude characters upon it, which are said to be usually, 'Om mani padme Om,' which has been translated to mean, 'All hail to the jewel in the flower of the lotus!' though some give other interpretations to these words. When his stone is thus prepared, the individual places it on the top of one of these walls, which on their upper surface are almost covered with such engraved stones. Thibetans when passing these walls, always keep them on their right hand, and frequently go out of their direct road in order to do this."

There would seem, then, to be little doubt that the Terra-Cottas, plain and ornamented, and those also bearing the formula of the Buddhist faith, were votive offerings of a by-gone age.

In what little I can do to further the objects of the Society, I generally try to content myself with bringing facts to notice, and pointing out the resemblance between the remains found in India and those discovered in other parts of the world. It must be left to those who are better informed than myself, or who are more fortunate in being able to consult what has been written by authorities on the subject, to determine whether there is any real significance in the resemblance between the remains found at Sankisa and those of Hissarlik and Italy. I am not unprepared for the argument that a knife is a knife all the world over, and that this form of implement must have suggested itself to all people at an early stage of civilisation; and that the fact of implements in the form of knives having been found at Hissarlik and at Sankisa would not be sufficient to establish any connection between the settlers at these widely separated sites. It may also be urged that earthen spindle-whorls might naturally enough suggest themselves to different races situated far apart from one another. But surely there is something more than a chance resemblance in the several types of these remains and the style of their ornamentation? And does not the continual recurrence of, what we call, the Buddhist symbols on the Hissarlik finds, suggest the possibility of Hissarlik and Sankisa having been colonized by branches of the same race, be it Buddhist or not, one of which striking west from some point in Central Asia, found its way to the shores of the Mediterranean, whilst another, taking a southerly course, established itself in the Gangetic valley?

Supplementary Memorandum.

(With a Plate.)

Since writing this Memorandum on spindle-whorls, I have received from Sankisa a further consignment of these peculiar remains.

In my paper recently read before the Society I mentioned that the flat discs, plain and perforated, were to be found in large quantities. I have received a further large consignment. But the perforated ones are much less numerous than the others. It is unnecessary to send any more of these types.

Of what Schliemann calls the volcano-shaped Terra Cottas I have received several more. This bears out my view that they are numerous. Nos. 1 and 2, Plate XV*a*, are interesting from their decoration. The one it will be seen is decorated on the top. The other is decorated on the base with what would seem to be a flower and in a manner resembling the Hissarlik types.

I send also three more balls, Nos. 3-5. These are ornamented with stars, crosses and with lines. Several others of the same type have since reached me.

I have obtained many more clay seals of the same type as those already sent. One only marked No. 6 is different in its character from those already submitted to the Society.

No. 7, is a fragment of pottery highly ornamented with the rosette or wheel of the law, or whatever it may be, common on Buddhist remains.

I should be glad of any explanation of the peculiar piece of soapstone marked No. 8. Its ornamentation is curious. The grooves at the top will be noticed. It may possibly have been worn as an amulet.

Further enquiries are being made at Sankisa, and I hope to be able to obtain many more specimens showing various forms of ornamentation.

It has been suggested that the curious balls of various sizes with their different markings may have been intended to represent the sun, moon and stars.

I see that the genuineness of the antiquities found at Sankisa and Behar is doubted by some. But these sites do not see on an average one European visitor a year; as yet no one save myself has collected there these specimens, and so it is hardly to be supposed that the native mind has yet been sufficiently prepared to attempt to provide forgeries for a possible future trade in such articles.

Note on some copper Buddhist coins.—*By* H. Rivett-Carnac, Esq., C. S., C. I. E., F. S. A.

(With two Plates.)

I send for the inspection of the Society, some coins, mostly Buddhist from my Cabinet, some of which may perhaps prove of interest. They will not all, I think, be found described or figured in the works most readily accessible to Members, and it is possible some of them may be new types. I am indebted to Mr. A Carlleyle of the Archæological Survey for the readings on the coins.

Plate XVI, Nos. 1, 2. Legend *Vaisakha Devasa.* Two coins, if they may so be called, of the same type differing in size. They are evidently *casts, i. e.*, have been made in a mould prior to the time the art of stamping was discovered. On one side is the Bull taking here the place of the Elephant common to the earlier coins. The name tolerably clear above the Bull. On the obverse what looks like the Trisul of the Sanchi Topes, and the snake. I should be glad to know if this coin is known to the Society ?

No. 3. Legend *Rája Kamuda Senasa.* This coin resembles the preceding ones in several respects. The Bull again occupies the most prominent place. The legend is beneath the Bull ; near the head of the Bull is the sacred tree. Behind the Bull is the snake. At first sight this has the appearance of an elaborate tail of the Bull. But a careful inspection will show that the tail is separate and quite distinct On the obverse is the well known ornament which I think Fergusson calls the "Trisul," though it is different enough from Shiva's trident. It will be noticed that the marks on these coins have apparently been stamped in the same manner as those of the Mitras, found near Barelli and recently submitted by me to the Society. The Bull and Legend have been stamped in, as if with a square seal, and cover but a portion of the circular piece of metal. Perhaps these coins represent some of the earliest attempts at coining ?

No. 4. Legend *Aja Varmma* or *Asha Varmma ;* a coin of the same type as above ; the legend differing.

No. 5. Legend *Maphaba Varma.* The same remarks apply here also. The coin has been cut in two, and was just going to the melting-pot when I was fortunate enough to rescue the two pieces from a quantity of rubbish. It is to be feared that a good many coins are thus lost to us. All the above were obtained by me at Faizabád.

No. 6. *Maha Satama.* A coin apparently of the same type as above but in bad preservation.

No. 7. *Satya Mitrasa.*

No. 8. *Ayu Mitrasa.*

No. 9. *Saya Mitrasa.*

All of the well known "Cock and Bull" type, but new names I believe.

No. 10. *Yaya Mitra* (two specimens).

Plate XVII No. 11. *Vyaya Mitra.*

These coins seem much older than the preceding ones.

No. 12. (Lion) *Laranga* or *Larata* or *Lâjasa*. (Tree) *Súgáta-Yanapya.*

This coin is quite a different type from the preceding. On one side is a Lion much resembling the carvings found among the ruins of old Buddhist Temples.

No. 13. A pretty little Buddhist coin of a type I have not yet seen figured. The sacred tree is encircled by the snake forming a sort of rosette in the centre of the coin.

No. 14. These three little oddly-shaped specimens have all well stamped on one side what looks like the conventional Heraldic Lion. On the other side may be traced marks somewhat resembling the sign *Pisces* of the Zodiac.

No. 15. Two specimens of a coin which is perhaps new. On one side what looks like a Fish as in the preceding coins, on the other a Thor's Hammer (?) or perhaps the sign of Saturn combined with some other sign in such a manner as to form a monogram?

No. 16. Three little coins of sorts.

I should be glad for information regarding the dynasties, dates, &c., of these coins.

APPENDIX
TO "A COLLECTION OF HINDÍ ROOTS."

INDEX OF SANSKRIT ROOTS AND WORDS OCCURRING IN PAGES 33—80.

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ERRATA.

Page 83, line 22, read *budhya* for *budhga*.
,, 35, ,, 38, ,, Skr. *ṣak* ,, Skr. *sak*.
,, 44, ,, 1, ,, खिद् ,, खिद.
,, 44, ,, 6, ,, चोट् ,, चोट.
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,, 77, ,, 37, ,, Skr. N. ,, Skr.
,, 78, ,, 24, ,, Prithiráj ,, Prithiraj.

CORRIGENDA ET ADDENDA.

Page 1, *for* Trichinopoli, *read* Trichinopoly.
,, 2, *for* stubi *(passim)*, *read* stúbi.
,, 2, line 19, *for* purána, *read* púrana.
,, 2, ,, 20, (first word) for n *read* in.
,, 2, ,, 5, from bot., *for* a high, *read* high.
,, 3, ,, 12, from bot., add the following note :—

'The projecting beam ends are perhaps carved to represent *Yáli* (? Griffins') heads, and the spiral lumps noticed may be the Yáli's trunk coiled up above.'

Page 4, line 6, from bot., *for* Nachaiyár, *read* Náchaiyár.
,, 5, ,, 14, after metal *add*, somewhat like the Sabha (halls) at Chidambaram.
,, 5, ,, 8, from bot., insert an asterisk (*) with foot note :—

On a 2nd visit the former (upper) head appeared to be that of a ram with very curved horns, and its leg and foot cut off and put in its mouth as they still often do at village sacrificial feasts. The buffalo's head below has its tongue hanging out of its mouth.

Page 6, line 1, *after* Grám-munsif, *insert* or village officer.
,, 6, ,, 17, *after* new, *insert* Jaina.
,, 7, ,, 12, *for* Kasi *read* Kási.
,, 7, ,, 10, from bot., *after* or, *insert* Coleroon.

2nd paper p. 8.

Page 8, line 12, *for* flat silled *read* flat-silled.
,, 8, ,, 5, from bot., *for* shutter stone *read* shutter-stone.
,, 9, ,, 13, *for* nehropolis *read* necropolis.
,, 9, ,, 19, *for* similar *read kistvaen.*
,, 9, ,, 13, from bot., *for chadud read chathut.*
,, 9, last line, *for* Neilipatla *read* Nellipatla.
,, 10, line 7, *for* three or four *read* six or seven.

B. R. BRANFILL.

Journal, As. Soc. Bengal, Vol. XLIX, Part I, 1880.

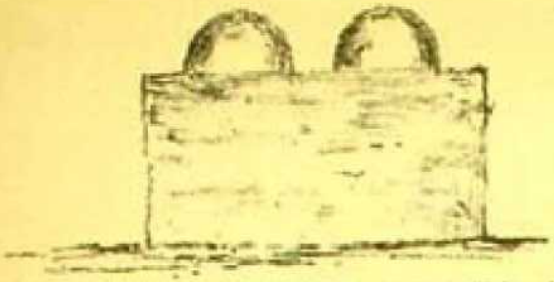


Fig. 1. Pathán Hut. Kandahar District.

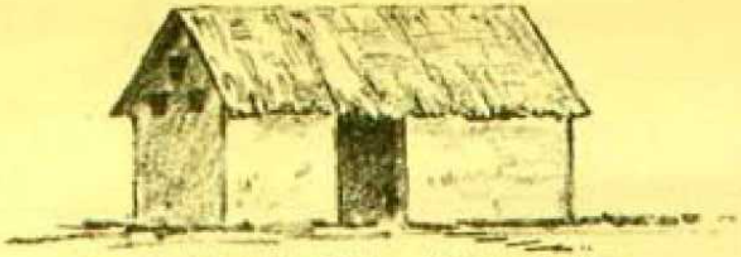


Fig. 2. Pathán Hut. Pishin Valley.

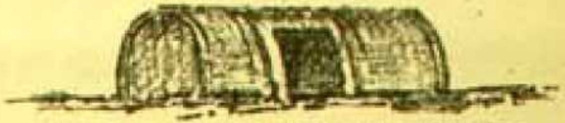


Fig. 3. An Achakzai Kizhdai or semi-permanent tent. Pishin and Kadanei Valleys.

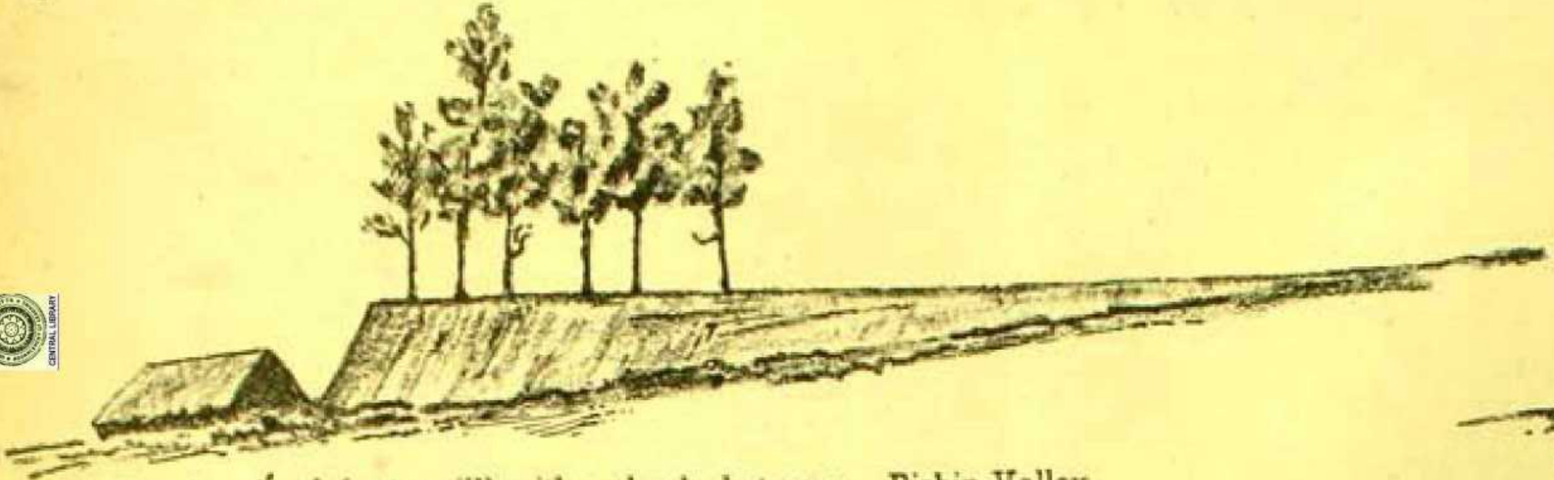


Fig. 4. Ásyá (watermill) with embanked stream. Pishin Valley.

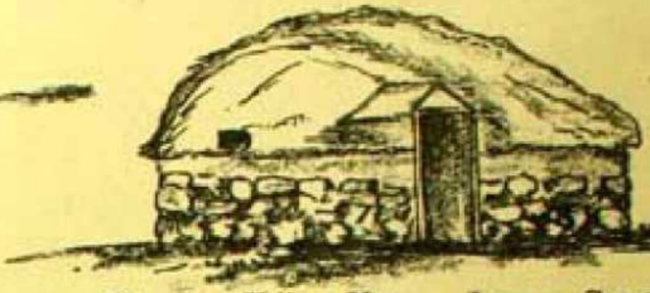


Fig. 5. Kákar Hut. Lower Gorge of the R. Ród (Ísaf Kach.)

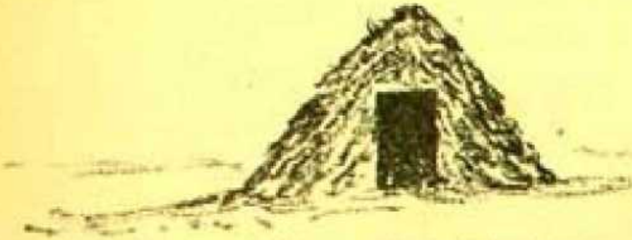


Fig. 6. Kákar Hut. Upper Gorge of the R. Ród (Zagan Kach.)

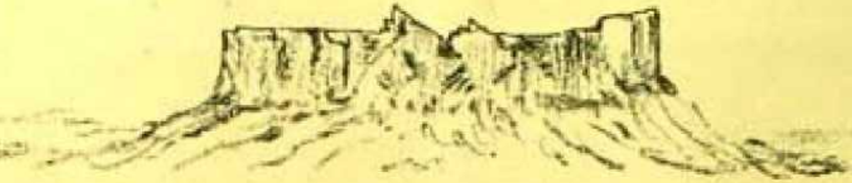


Fig. 7. Mt. Syájgai, 9,000 feet (a landmark in the Shór Valley, near Chimján) from Khwáṛa looking East. (No Scale.)

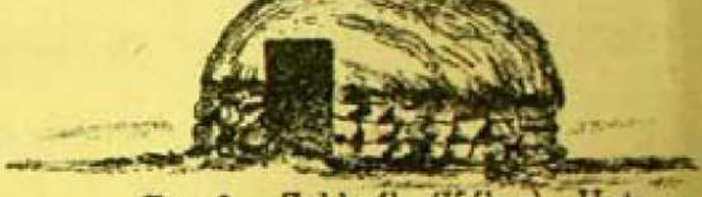


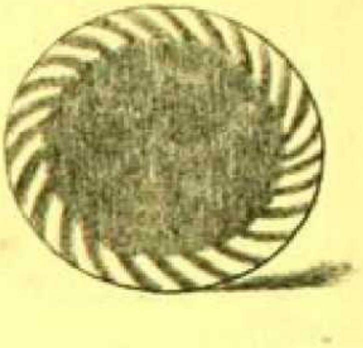
Fig. 8. Zakhpél (Kákar) Hut. Shór Valley. Chimján.

R. C. Temple, del.

Zincographed at the Surveyor General's Office, Calcutta.

SKETCHES FROM AFGHANISTAN.

2.



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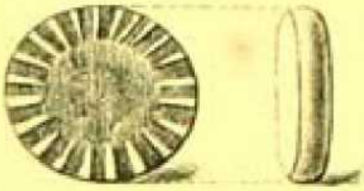

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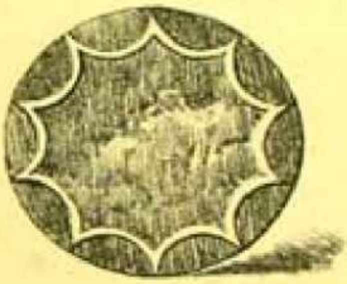

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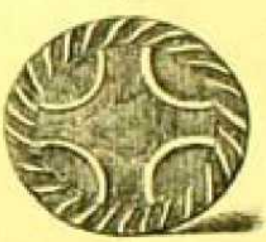

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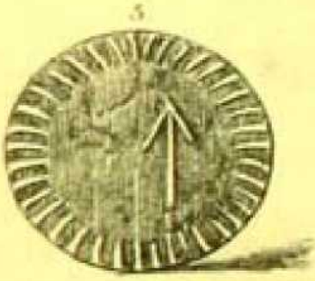

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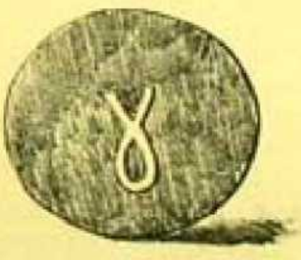

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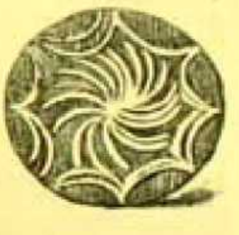

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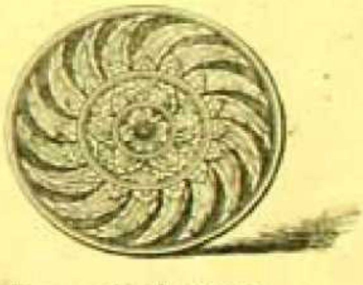
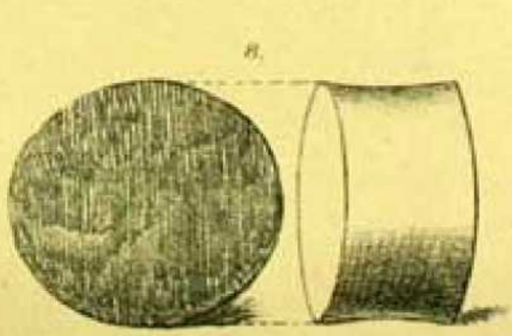


From Alabaster's
The wheel of the Law

8.



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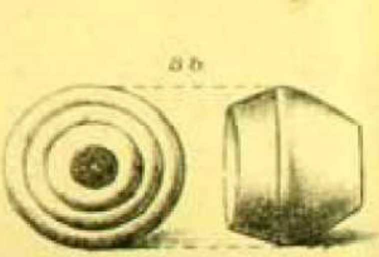

From Gastaldi's
Italian Antiquities
(See No. 12.)

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H. Rivett-Carnac. Fecit.

SPINDLE WHORLS ETC. FOUND AT SANKISA BEHAR
AND OTHER BUDDHIST RUINS

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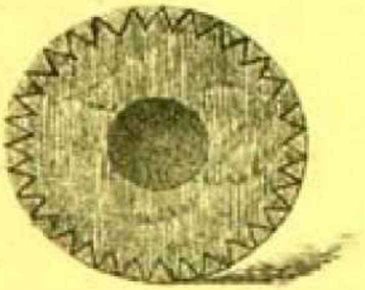
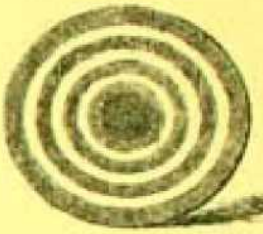


10 a.

10. From Schliemann (P. 137.)

10 b.



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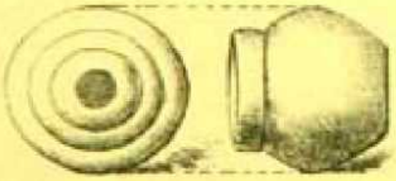

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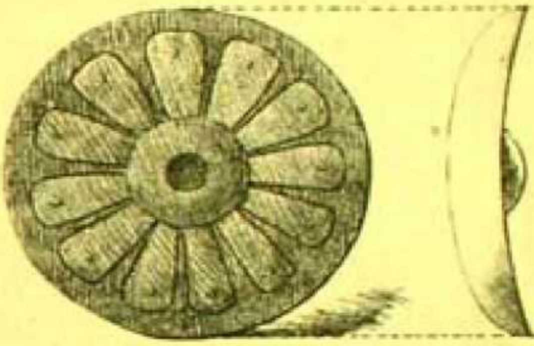

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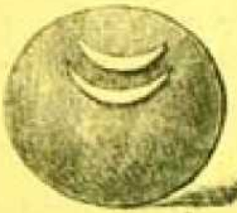

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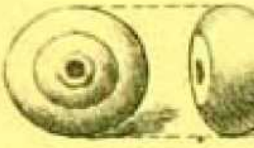

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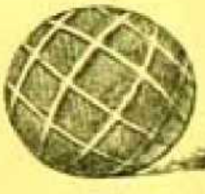

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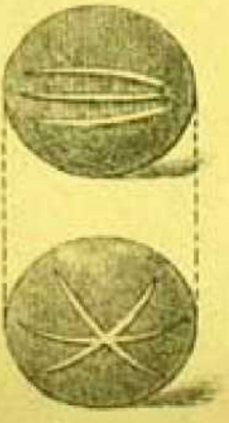

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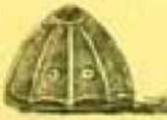

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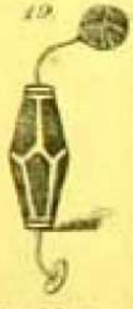

19. Glass Enamelled bead

Lith. & Printed by W. Newman & Co. Calcutta. [illegible]

SPINDLE WHORLS ETC. FOUND AT SANKISA BEHAR AND OTHER BUDDHIST RUINS.

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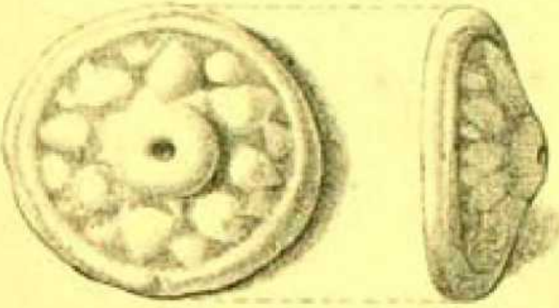

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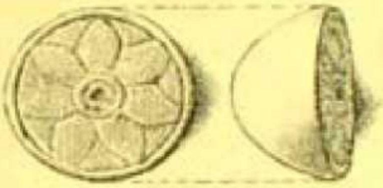

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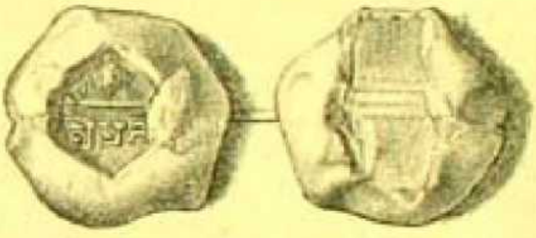

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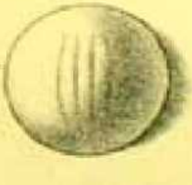

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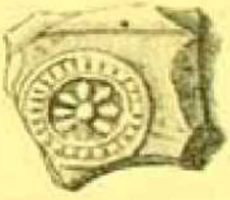

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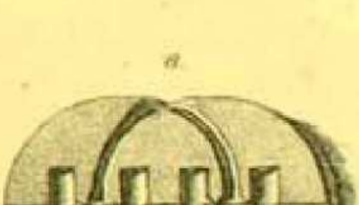

(All half-size.)

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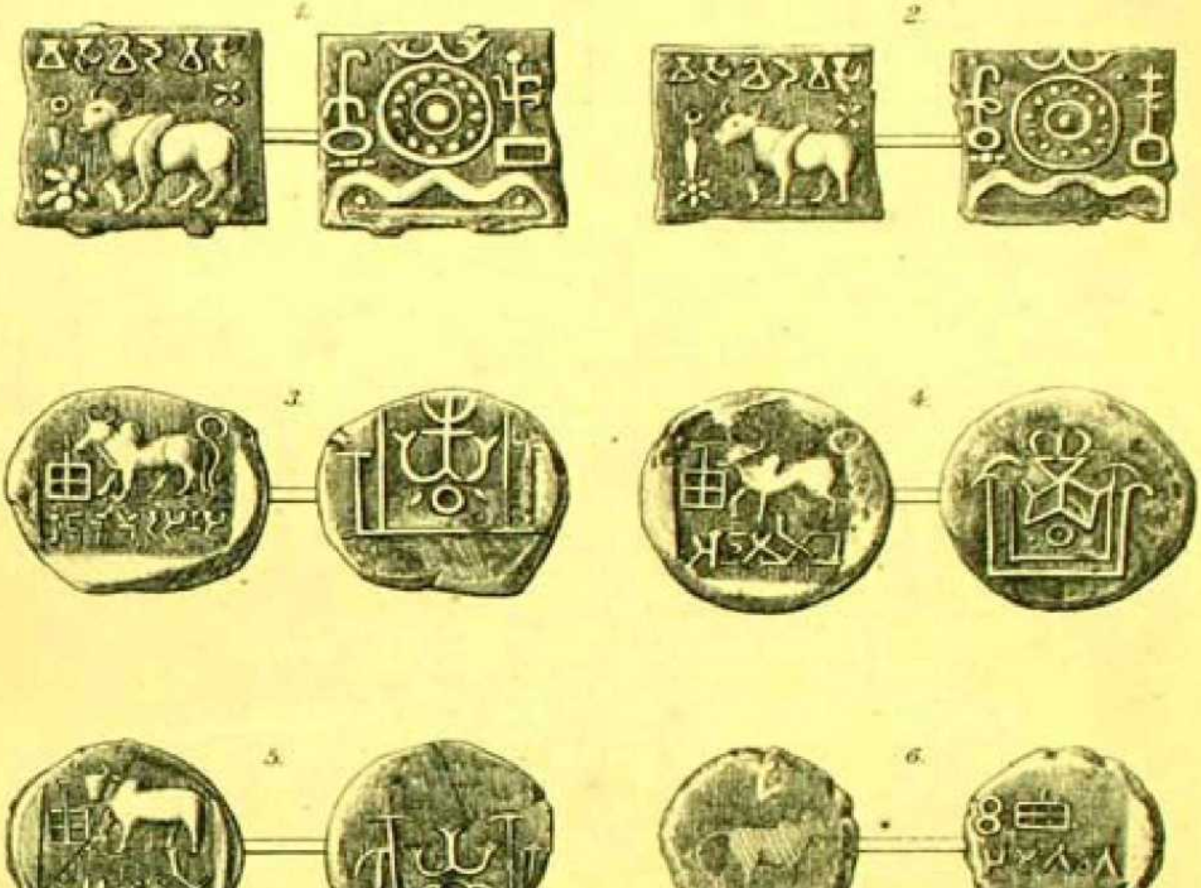
Calcutta.

SPINDLE WHORLS ETC. FOUND AT SANKISA BEHAR
AND OTHER BUDDHIST RUINS.



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COPPER BUDDHIST COINS.

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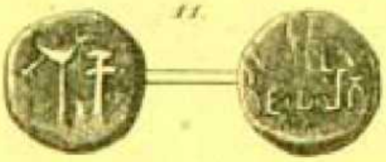

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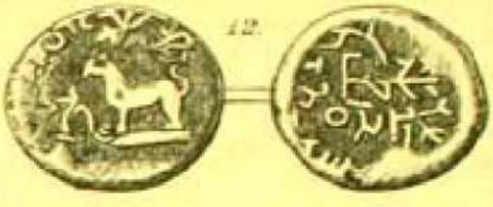

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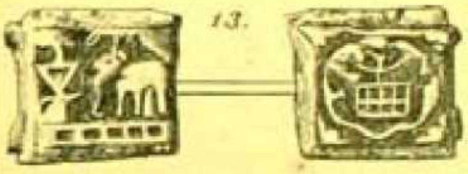

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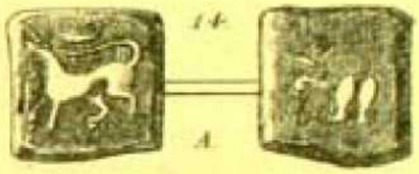

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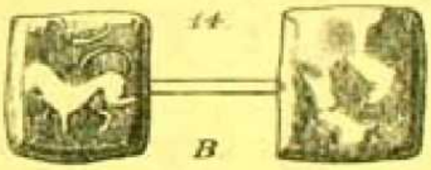

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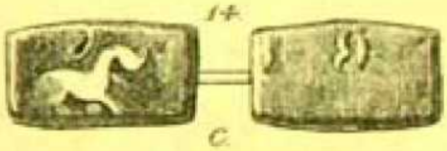

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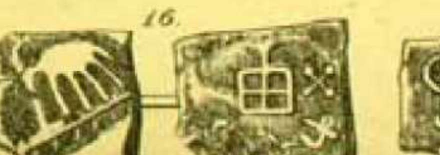

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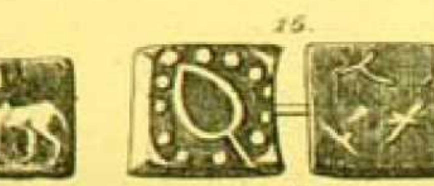

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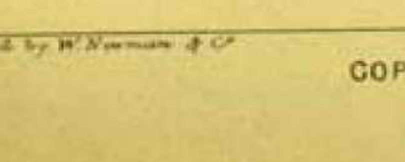

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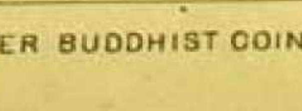

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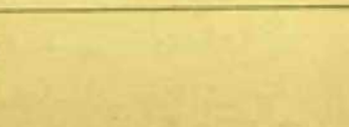

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COPPER BUDDHIST COINS.

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

Part I.—HISTORY, LITERATURE, &c.

No. IV.—1880.

Remarks on the Afghâns found along the Route of the Tal Chotiali Field Force, in the Spring of 1879.—*By* LIEUT. R. C. TEMPLE, B. S. C., F. R. G. S., M. R. A. S. &c. (With 3 Plates and 2 Maps).

(*Concluded from page* 107.)

PART II.

III. *Distribution of the Tribes.*

In the above description of the Tribes along the Tal Chótiáli Route their distribution *en route* has been but briefly referred to. In the next Table the names of the tribes inhabiting the villages on the accompanying map are shown. And it will be seen that as a rule the Paṭhán Tribes and Sections stick pretty well together and are generally to be found in certain compact districts and nowhere else.* Thus Achakzais are confined to the region about TO'BA and the KHO'JA AMRÁN range, and the TO'R TARÍNS to the Pishin Valley. Among the Kákar sections the same thing is to be observed. The AMAND KHE'L occupy the country about the north of the Pishin to Mt. KAND and the SULIMÁN KHE'L the range dividing the Pishin and DO'F Valleys, the MEHTARZAIS all the country to the north of the R. RO'D Gorge and the PÁNÍZAIS that to the south of it and so on. Even where the country seems to be pretty well divided between sections, as the DO'F

---

* Villages of mixed populations are to be found in the more settled parts, such as the Pishin, DO'F, and GWA'L Valleys, though not commonly, and when it is said that a certain village is occupied by a certain subsection or section it is meant that the main portion of the inhabitants belong to it. As a rule, however, villages are not mixed.

Valley and the RO'D River Gorge, it is divided only among a few, as only BÁZAIS, SHAMOZAIS, SURGARAIS, MALAGAIS, ISA' KHE'LS and SARA'NGZAIS amid the surrounding MEHTARZAIS and PANÍZAIS are found in the districts in question. Sayads do not seem to have penetrated into the Kákar country beyond the R. RO'D, near which there is one village of them, and a few SPÍN TARÍNS are said to be about ÁLÍZAI in the Pishin, but practically there seems to be no communication between the SPÍN and the TO'R TARÍNS. The DUMARS probably occupy all the country to the south of the SHO'R Valley from Mt. MAZHWÖ to the TAL Valley, but in the ZHO'B Valley the tribes seem to be mixed, though the ZHO'B Valley Kákars seem to be a section apart and to hang together.

Tribe.	Division.	Section.	Subdivision.	Subsection.	Village.	District.
DURA'NI	ZI'RAK	PO'PALZAI	...	SADOZAI	PO'PALZAI	PISHIN.
		BA'RAKZAI	...	MOHAMMADZAI	ASAD KHA'N	Do.
		"		"	KHU'SHDIL KHA'N	Do.
		ACHAKZAI	BAHA'DURZAI	KA'KOZAI	MI'RKALAM KHA'N	Do.
		"	"	"	KA'KOZAI	Do.
		"	"	ABDAL	KALA ABDULLA KHA'N	Do.
		"	"	"	TANGAI	Do.
		"	"	"	MADAT	Do.
		"	GAJANZAI	HABI'BZAI	HABI'BULLA	Do.
TARI'N	TO'R	BADOZAI	...	...	BADWA'N	Do.
	TARI'N	KHA'NIZAI	...	LU'R KHA'NIZAI	MOHAMMAD SA'DIK	Do.
		"		"	LA'L MOHAMMAD	Do.
		"		"	VAKI'L	Do.
		"	...	DAB KHA'NIZAI	DAB KHA'NIZAI	Do.
		ÁLI'ZAI	...	...	GAURI	Do.
		"	...	...	SAYAMZAI	Do.
		"	...	...	ÁLI'ZAI	Do.
		"	...	...	ÁTÁ MOHAMMAD	Do.
		"	...	...	SOPÁNZAI	Do.
		NU'RZAI	...	...	NU'RZAI	Do.
		KULÁZAI	...	...	SKAN	Do.

TARI'N	TO'R	"	...	...	TO'TI	Do.
	TARI'N	MU'SIZAI	...	...	RAHAMDIL KHÁN	Do.
		"	...	...	DÁDGWAL	Do.
		"	...	...	NO'A BA'ZA'R	Do.
		MA'LIKYA'R	...	...	MA'LIKYA'R	Do.
		MA'EZAI	...	...	BRIJA'N KALA	Do.
		HAIKALZAI	...	...	HAIKALZAI	Do.
		MANZAKAI	...	...	MANZAKAI	Do.
		MA'LIKAI	...	...	MA'LIKAI	Do.
		HA'RU'N	...	...	SIRE' KHILA	Do.
		"	...	...	SHE'KHA'LZAI	Do.
		KAMA'LZAI	...	...	KAMA'LZAI	Do.
	SPIN	none named	...	...	SHINLE'Z	TAL and
	TARÍN		...	...		CHOTIALI.
		"	...	...	TAL	Do.
		"	...	...	CHO'TIA'LI	Do.
		"	...	...	RAHA	Do.
		"	...	...	KO'LU	Do.
		"	...	...	BRAHAMZAI KHELA'T	Do.
KA'KAR	LO'WE'	KHWAIDA'DZAI	...	...	KHWAI	ZHO'B.
	KA'KA'R	MURSIA'NGZAI	...	...	GHUNDAMARAI	Do.
		SURGARAI	...	...	HINDU' BA'GH	Do.
		MEHTARZAI	...	...	WARGHAS	Do.
		MU'SA' KHE'L	...	...	BA'ZA'R	Do.
		BA'RAKZAI	...	...	BARSHO'R	Mt. KAND
		none named	...	...	GHURAT	ZHO'B.
	KUCHNAI	SULIMA'N KHE'L	...	TRAGARAI	SHARAN	DO'P.
	KA'KAR	"	...	"	NARÍN	Do.
		"	...	"	MURGHAI	Do.
		AMAND KHE'L	...	...	HA'JÍ KHA'N	PISHIN.
KA'KAR		"	...	...	KA'MIL KHA'N	TO'BA.
		MEHTARZAI	...	...	KHUNCHAGAI	Mt. KAND

Tribe.	Division.	Section.	Subdivision.	Subsection.	Village.	District
Ka'kar		Mehtarzai	...	...	Mehtarzai	Do.
		„	...	...	Bargai	Do'f.
		„	...	...	Tlarai	Do.
		„	...	...	Sadoh	Do.
		„	...	...	Ja'fir Got	Gwa'l.
		„	...	...	Sraghar	Ro'd R. Gorge.
		„	...	...	Zagan Kach	Do.
		Pa'nízai	...	Ádizai	Ámadu'n	Mt. Píl.
		„	...	„	Go'gai	Do.
		„	...	„	Ro'dgai	Do.
		„	...	no subsection named	Shama'wan	Do'f.
		„	...	...	Sa'ghai	Do.
		„	...	...	Balozai Ka're'z	Do.
		„	...	...	Kha'nizai Ka're'z	Do.
		„	...	...	Shakar	Do.
		„	...	...	Gwa'l	Gwa'l.
		„	...	...	Manzakai	Do.
		„	...	...	Chauku'l	Do.
		„	...	...	Bo'sta'n	Do.
		„	...	...	Waría Kach	Ro'd R. Gorge.
		„	...	...	Brahima'n	Mt. Píl.
		Ba'zai	...	...	Murghai	Do'f.
		„	...	...	Dilsho'r	Do.
		„	...	...	Safkha'n Ka're'z	Gwa'l.
		„	...	...	Nílai	Do.
		„	...	...	Karam	Do.
		„	...	...	Akhundza'da Go't	Do.
		„	...	...	Ko'sh Kach	Ro'd R. Gorge.

Ka'kar	"	...	...	Ta'zí Kach	Do.
	Shamozai	...	...	Lu'r Anga'ng	Do'f.
	"	...	...	Ku'z Anga'ng	Do.
	"	...	...	Me'kha'n	Do.
	"	...	...	Wochakhla	Do.
	"	...		Ísa'f Kach	Do.
	"	...	...	Wargai	Do.
	"	...	...	Shudand	Do.
	Surgarai	...	...	Khu'shla'k	Khúshlák
	Malagai	...	...	Shna'khorai	Ro'd R. Gorge.
	"	...		Kudín	Do.
	Ísa' Khe'l	...	...	Tlarai	Do'f.
	"	...	...	Ka'han	Do.
	"	...	...	Ksho'i Ka're'z	Do.
	"	...	...	Wulgai	Gwa'l.
	"	...	...	Kha'nai	Do.
	Sara'ngzai	...	Mula'zai	Mula'zai	Ro'd R. Gorge.
	"	...	Ta'ra'n	Kudín	Do.
	"	...	...	Adak Tangai	Do.
	"	...	no subsection named	Zarghu'n Ka're'z	Do'f.
	"	...	...	Mohammad Sharíf	Do.
	"	...	...	Mo'sai	Do.
	"	...	...	Snaga'l	Ro'd R. Gorge.
	"	...	...	Sara'ngzai	Do.
	"	...	...	Spe'zhandai	Mt. Spinskhar.
		...	...		
	"	...	...	Zarghai	Do.
	Zakhpe'l	...	Amakai	Kach	Sho'r.
	"	.	Kanozai	Kwo'i	She'rín.
	"	...	...	She'rín	Do.

Tribe.	Division.	Section.	Subdivision.	Subsection.	Village.	District.
KA'KAR		ZAKHPE'L	...	NO'AZAI	BAIA'NAI	GHAZGAI
		”	...	...	GHÍRKHWA'	Do.
		”	...	no subsection named	GURMAI	SHO'R.
		”	...	...	KURBÍ	Do.
		”	...	...	SA'LA'ZH	Do.
		”	...	...	CHIMJA'N	Do.
		”	...	...	DARGAI	Do.
		”	...	...	CHINA'LI	Do.
		DUMAR	...	...	RA'DINGZAI	Mt. SPINSKHAR.
		”	...	...		
		”	...	...	O'BUSHTKAI	SHO'R.
		”	...	...	SINZAWAI	SMALAN.
		”	...	...	SMALAN	Do.
		”	...	...	SHAKA'RE'Z	Do.
		”	...	...	BAGHA'WA	Do.
		UTMA'N KHE'L	...	...	NINGA'ND	GHAZGAI.
		”	...	...	ALAM BA'GH	Do.
		”	...	...	NUMA'RA'	Do.
		”	...	...	SARKAI ZANGAL	Do.
		”	...	...	GHURAT	ZHO'B.
		”	...	...	BAKHMA'	BO'RAI.
		”	...	...	SAGAR	Do.
		”	...	...	LASHTAI	Do.
		”	...	...	JALKA'RE'Z	Do.
		”	...	...	SHAKA'RE'Z	Do.
		”	...	...	RO'DLI'N	Do.
		”	...	...	ARBASI'N	Do.
		”	...	...	KO'T	Do.
		SANDAR KHE'L	...	A'LI'ZAI	WARIA'GAI	Do.
		”	...	...	KHANKAI	Do.
		”	...	...	ZANGIWA'L	Do.

Ka'kar	Sandar Khe'l	...	Dargai	Dargai	Do.
	"	...	Shabozai	Shabozai	Do.
	"	...	Mu'r	Lo'we' Mu'r	Do.
	"	...	...	Kuchnai Mu'r	Do.
	"	...	Waha'r	Kaun Waha'r	Do.
	"	...	"	Lo Waha'r	Do.
	"	...	"	Navgivya'la	Do.
	"	...	no subsection named	Di'lai	Do.
	"	...	"	Kuzarai	Do.
	"	...	"	Tugarai	Do.
	"	...	"	Ko'wandai	Do.
	"	...	"	Sarka're'z	Do.
	"	...	"	Chi'nai	Do.
	"	...	"	Sargharai	Do.
	"	...	"	Da'lo,r	Do.
	"	...	"	Kachai	Do.
	"	...	"	Kana'	Do.
	"	...	"	To'ra	Do.
	"	...	"	Cha'gai	Do.
	"	...	"	Navgivya'la	Do.
	"	...	"	Mu'ltat	Do.
	"	...	"	La'ho'r	Do.
	"	...	"	Sa'gai	Do.
	"	...	"	Sharan	Do.
	"	...	"	Sha'ba'n	Do.
	"	...	"	Sharan Ka're'z	Do.
	"	...	"	Kach	Do.
	"	...	"	Sarghar	Do.
	"	...	"	Barminai	Do.
	"	...	"	China' Ko't	Do.
	"	...	"	Naigwa'l	Do.
Lu'ni Khe'l	no sections named	...	...	Paind Kha'n Ko't	Lu'ni.

Tribe.	Division.	Section.	Subdivision.	Subsection.	Village.	District.
	LU'NI KHE'L	none named	...	...	LASHKAR KHA'N	Do.
		"	...	...	LU'NI	Do.
		"	...	...	NU'R KHA'N	Do.
		"	...	...	ALAB	Do.
		"	...	...	SHAUGWA'L	Do.
		"	...	...	SOBA'T	Do.
		"	...	...	CHI'NAI	Do.
		"	...	...	MISRI'	Do.
		"	...	...	SAMANDAR KHA'N	Do.
		"	...	...	SARA'GI'	Do.
?	SAYAD	KARBE'LA	...	..	KARBE'LAI	PISHIN.
		SAYAD	...	GANGALZAI	SHA'H DA'D	Do.
		"	...	BAGARZAI	SAYAD PAIYO	Do.
		"	...	"	SAYAD ALAB	Do.
		"	...	AJABZAI	AJABZAI	Do.
		"	...	SHA'DI'ZAI	SHA'DI'ZAI	Do.
		"	...	BRAHAMZAI	SAYAD LA'L	Do.
		"	...	"	SAYAD KHAMA'NDAI	Do.
		"	...	"	SAYAD DO'ST MOHAMMAD	Do.
		"	...	"		
		"	...	HAIDARZAI	HAIDARZAI	Do.
		"	...	YA'SINGZAI	SAYAD TO'TI	Do.
		"	...	"	SAYAD SHE'RBAT	Do.
		"	...	URUMZAI	SAYAD SA'LO	Do.
		"	...	no subsection named	SAYAD MU'LLA ALLA'HDAD	Do.
		"	...	"		
		"	...	"	SAYAD PAIND	Do.
		"	...	"	HAJI'ZI'	Do.
		"	...	"	TURKHE'L	Do.
		"	...	"	SHAGHI'N	RO'D R. Gorge.
		"	...	"		

IV. *Polity.*

The portion of Afghánistán along the route may be divided into that formerly subject to the Amír of Kábul, and that acknowledging no superior authority, into, in fact, the Amír's Territory and the country of Independent Tribes. The Amír's power never seems to have extended beyond the Do'F Valley to the eastwards further than I'SAF KACH, or further north in that direction than Mt. KAND, *i. e.*, the inhabitants of the ZHO'B Valley and all the country south of it eastwards of the Do'F Valley have never recognised him as their ruler. The tribes then under the Amír's sway were the Duránis, the Tór Taríns and such Kákars as inhabited the Do'F and GWÁL Valleys, while the bulk of the Kákars, the Lúnis, the Zarkháns and the Spín Taríns have always been independent. For the purposes of this paper the country will be divided into Amír's Territory and YA'GHISTA'N or Independent Territory.

Under the Amír, Government in our sense of the term there was none, though the head of the Government nominally ruled through his Sirdárs or heads of tribes and sections, having, however, little real control over them. And how this system was worked has been thus described.* "The Sovereign is absolute and makes any and every change which may appear to him necessary or proper in the government and administration. He can dispose of the lives and property of his subjects and is kept within certain bounds in these respects only by the calculations which prudence dictates. Religion is the counterpoise to his authority. This gives the clergy great influence, one that he might try in vain to subject to his will and pleasure, and vainer still would be the attempt to infringe and invade the rights and privileges of the sirdárs or chiefs of tribes, who would never consent to resign a certain influence in the affairs of government. It may be said in Afghánistán that there are as many sovereigns as sirdárs, for each of them governs after his own fashion. They are jealous, turbulent and ambitious, and the sovereign can restrain and keep them in some order only by taking advantage of their rivalry and feuds and opposing one to the other. There is no unity, nothing is permanent, everything depends on the pleasure or caprice of a number of despots always at variance with each other and making their tribes espouse their personal quarrels. A constant feeling of irascibility is the result which finally leads to sanguinary civil wars and throws the country into a state of anarchy and perpetual confusion. The sirdárs are at one and the same time the strength and the curse of the monarch. Prompt to take arms and defend him when a good understanding between them exists, they are as ready to revolt against him when they find or think they have the smallest interest in doing so. In anything, however, to which they are disinclined, they would not obey even the sovereign of their choice but with reluctance; moreover they are always impatient to see him replaced by another from whom they hope to obtain greater advantages. Each subdivision of a tribe is, according to its numerical force and extent of territory, commanded by one or more sirdárs. These chiefs may be compared to the dukes and barons of the middle ages in France, the more powerful to the knights bannerets, and those having authority over only a few families to the esquires who in time of war enrol themselves and their men under the orders of the chief that inspires them with the greatest confidence and can pay them best.* The most powerful amongst them are caressed by the sovereign who attaches them to his interests much more by the concessions he makes than by the fear he inspires. Ordinarily and with a view to preserve a nominal authority over them, he remits the whole of the taxes and imposes in their stead the obligation to furnish a contingent of troops in the event of war being declared against him by his neighbours. This wretched system gives too much power to the Sirdárs. The sovereign is at their mercy, and it is the ambition of these men that gives birth to the numerous civil wars in Afghánistán; for they are constantly in revolt."

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* Macgregor's Gazetteer.

Such being the state of civil government in the Amír's Territory, the only difference to be observed in the Independent Territory is, that the local Sirdár, or whatever other local chief happens at the time to be the most powerful, is absolutely uncontrolled even by the semblance of superior power. The above-mentioned independence of the Sirdárs and their impatience of superior control is to be observed in numerous instances even in the Kháns or rulers of villages, being of course more pronounced in YA'GHISTA'N than in the Pishin and other portions of the Amír's Territory. To give an example. In the Pishin the ruins of a village called SAYAD SA'LO or URUMZAI were passed. It had been but recently destroyed by a more powerful neighbouring village called SAYAD PAIND in a quarrel between the two Kháns. The URUMZAIS had to fly altogether out of Afghán Territory across the Belo'ch Border to KHU'SHLA'K where they settled. They appear to have been hunted across the Border by the other village without any attempt at interference on the part of the neighbours. Again not far from this last were two villages, Old and New MA'LIKYA'R, the old village having been deserted on account of an internal dispute and a new site selected a few miles off. The same thing was to be observed at a place called WARIA'GAI in the BO'RAI valley, where an evidently lately ruined village called Old WARIA'GAI was passed. I was informed it had become so about five years before on account of an internal squabble. Like the

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* The very remarkable parallel to be observed politically between the Afgháns and the Mainotes of Greece I have elsewhere pointed out. J. U. S. I. of India, 1880.

Barons of European feudal times these village Kháns seem to exercise the right of private war on their neighbours without control or interference. Certain villages have acquired an evil name for this kind of truculence. KACH in the SHO'R valley is such a village. Nor is a fight or quarrel always a necessary reason for a change of site, any caprice or change of owners is sufficient. A case in point is the fort of HA'JÍ KHA'N (AMAND KHE'L) in the Pishin. And towards the Border by the HAN Pass, in the long stretch of disputed land about the passes, ruined villages are naturally to be seen in the more exposed parts of the LU'NI KHE'L, ZARKHA'N and SPÍN TARÍN country on the Afghán side and in BA'RKHO'M on the Beloch side, the result of endless border raids. The lawlessness of the GHILZAIS along the roads between Kandahár and Kábul has been noticed by former travellers, one of whom has written :* "Every man distrusts his neighbour or is at open feud with him. It is the custom of the country to throw a heap of stones over murdered travellers, and in the ravine leading from SHILGAR to ZURMAT (Ghilzai country) the frequency of these heaps is sickening. In many cases they are to be found at the closed end of the ravines showing how the poor travellers have run as far as possible and then been cut down." The same may be remarked of almost any part of the Kákar country, and in that portion about Mts. MA'ZHWÖ and SPINSKHAR where the heights are crossed between the USH and NANGALU'NA Passes, there is a long narrow valley between low hills to be crossed, and in this it is hardly any exaggeration to say that these heaps may be seen but a few yards apart. The reason appears to be that persons going from the SHO'R and BO'RAI Valleys or the DUMAR country from the south towards the Pishin must pass this way through a country which is for some thirty miles utterly uninhabited. In the wild uninhabited border tract about the HAN, HANOKAI and TRÍKH KURAM passes they may be seen in clusters in many places telling of some fights either among the local tribes themselves or with the Belóchis.

The mutual distrust among the tribes and even sections inhabiting different districts is so great as to result in an almost absolute ignorance of each other. They appear to have a real fear of going into each other's country and invariably give one another a bad character. Thus KA'KARS are an abomination to TARÍNS and ACHAKZAIS and LU'NIS to KA'KARS, while the wretched ZARKHA'N is harried on all sides. The I'SA' KHE'L Kákars and the inhabitants of the GWA'L valley manifested an extraordinary fear of the PA'NÍZAI Kákars of the hills to the east of them. SANDAR KHE'L Kákars could not be induced to venture into the neighbouring LUNÍ territory and I did not personally meet a man who had been towards GHAZNI by the TO'BA Plateau or along the Tal Chótiáli Route. A guide from the Do'F Balley an I'SA' KHE'L, showed the liveliest anxiety to get back again from ISPIRA RA'GHA and would not venture into the ZAKHPE'L Territory and an old UTMA'N KHE'L guide told me he had never ventured beyond the territories of his section of the Kákars.

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* Macgregor's Gazetteer.

The structure of the houses in the more civilized parts, which in the hills consist of nothing more than rough mud and thatch, is a further proof of the general lawlessness of the population. In the GHAZGAI, BO'RAI and LU'NI Valleys, among the UTMA'N, SANDAR and LU'NI KHE'LS a house is nothing less than a fort round which, frequently within walls, is the cultivation necessary to support life, and when the crops are gathered they are stored in little round mud towers which I have shown elsewhere to contain just enough grain for one family for a year. In the Do'F Valley, however, I only saw one fort in a village called KHA'NIZAI KA'RE'Z and in the Pishin the villages were all open. Life in the Pishin among the TARÍNS and SAYADS seems to have been much more settled than elsewhere, but the ACHAKZAIS have a bad name as thieves and robbers.

Government among the Duránis differs considerably from that of the other tribes, noticeable chiefly in its regularity and order. Each section of the Duránis is governed by a sirdár and each subsection by a MALIK or MUSHIR. The principle is election qualified by hereditary claims, *i. e.*, the sirdár is elected from the chief family of the clan or section, and the malik from the chief family of the subsection. The sirdár has a deputy or naib always a near relative appointed by himself. Their occupation of the land is directly from the Amír on the condition of military service. Among themselves the Duránis do not as a rule resort to private revenge, hence internal blood-feuds do not exist among them as among other tribes. Their disputes are settled by the "JIRGA" backed up by the sirdár, by the interposition of the elders, by friends of the parties, by the priests (MULLAS), or by the civil and ecclesiastical judges (KA'ZI'S). The ACHAKZAIS, the section of the Duránis met with en route, are the wildest of those inhabiting South Afghánistán and are entirely a nomad race, hardly ever living in a house. They inhabit the TO'BA Plateau and during the summer roam over it with their flocks and spread themselves over the lower slopes of the KHO'JA AMRA'N Range about the KADANEI and Pishin Valleys during the winter, where their black tents or KIZHDAIS are to be seen everywhere. Their Sirdár is at present MÍR ASLAM KHA'N, son of MÍR ABDULLA KHA'N who built the well known fort or village of that name at the Pishin entrance of the KHO'JAK Pass.

The Kákars and Independent Paṭháns do not apparently recognise any particular sirdár or chief, and probably any man rules who has the requisite force of character, though birth, on which an Afghán always sets such an extravagant value, is pretty sure to exercise considerable weight in the selection of a ruler. Thus SAMANDAR KHA'N of the LU'NIS, now their leader, is the son or near relative of PAIND KHA'N their late ruler. SHA'H JEHA'N of KHASNO'B (ZHO'B valley) is a great man among the Kákars and GWARAT KHA'N among the SANDAR KHE'L.

V. *Civilization.*

As regards civilization, except as to dress, methods of cultivation and dwellings, but little could be observed in such a hurried journey as mine.

On the first point there is little to be noticed beyond what has been already written about it by the authors of the following:* "The Afgháns wear their clothes long. They consist of two large very ample robes and are either of cotton or a cloth made of camel's hair† called BAREK: this is the dress of the people. The only difference in the garments of the rich is the material, which is silk, cloth or Kashmír. In summer they are made without lining, but in winter they are wadded with cotton or lined with fur. The under-garment is confined by a piece of muslin or long-cloth which is wound round the body. The outside one, and sometimes a third robe, is used as a cloak, and a person would be considered as wanting in politeness if on visiting a superior he did not put it on. The shirt is very full and the sleeves which reach below the hands particularly so.‡ The former is open to the sides from the neck to the waist and falls over the trousers, and these which are excessively large, open at the foot and are drawn in at the waist with a string. The head is covered by an enormous blue or white turban and the feet with slippers without quarters. The upper classes are for the most part simply dressed and consider luxury in this respect as enervating, but some young chiefs have their robes embroidered with gold thread and ornamented with gold lace. This is done in the harems by the women who excel in this kind of work, particularly in Kandahár. The Afgháns are not careful of their clothes and soil them the very first day they are put on, for they squat on the ground without taking the least thought whether the spot on which they sit is clean or dirty. They never change their garments, not even the shirt, until they are completely worn out, and as they rarely wash themselves they are constantly covered with vermin great and small."

In the matter of dress excepting the Achakzais, the Duránis show as usual a considerable superiority over the other tribes. The following was found to be a fairly true description of their dress.§ "The Duránis about towns, most of those in villages and all those of the shepherds who are in easy circumstances wear a dress nearly resembling that of Persia, which though not very convenient is remarkably decorous and with the addition of a beard gives an appearance of gravity and respectability to the lowest of the common people. The poorer Duránis, particularly among the shepherds, wear a wide skirt and mantle. The poor only change their clothes on Fridays and often only every other Friday, but they bathe once a week at least, and their prayers require them to wash their faces, beards and hands and arms many times in the course of the day. The little Kháns all over the country wear the Persian dress. Their coats are made of silk, satin, and a mixture of silk and cotton called Garmsut, and sometimes of brocade, and they all wear shawl girdles and a shawl round their caps. Their cloaks also are of broadcloth often red or of silk of different colours." To the Achakzais the above remarks hardly apply except in a very general way. Their manner of dress is the same, but they seldom or never change their clothes as long as they last, and consequently go about in filthy rags often half tumbling off them. They are in dress as in everything else the most uncouth and uncivilized of the great clan to which they belong.

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* Macgregor's Gazetteer.

† A thick white material like felt for the outer cloak is common about Kandahár and the Pishin, and to this is often added a "póshtín" or coat of skin with the hair turned inwards.

‡ The cloaks about Kandahár and all over the South have frequently long false sleeves reaching nearly to the ground.

§ Macgregor's Gazetteer.

With regard to the Sayads, Taríns and Kákars, etc. met with en route there is little to be remarked except that they all wore the unmistakeable Afghán dress. In the more civilized valleys as the Pishin, Dóf, Gwál, Ghazgai and the Bórai the dress was better and more respectable answering to the above given description of the Duráni dress.* But in the hill districts especially in the elevated region about Mt. Mázhwö the dress merely appeared to be a collection of dirty rags, the remains of what was originally the national costume. The Pánízais, Mehtarzais, Sarángzais, Amand and Sulimán Khe′ls, Dumars and Zakhpe′ls among the Kákars bear off the palm for dirt and squalor. The Ísá, Utmán and Sandar Khe′ls are much cleaner and neater in appearance and altogether better dressed. The Lu′nis and Zarkháns met with wore the dirtier and more ragged class of dress, but with the exception of the Sandar Khe′l Kákars the Pishin Sayads were the best-dressed people I recollect to have seen on the road.

The dwellings were found to differ considerably in different parts of the route. Those about the Pishin and Dóf valleys were apparently constructed on the same principles, whether Sayad, Tarín, Achakzai or Kákar. Tribe indeed does not apparently affect the construction of dwellings so much as locality.

The most noticeable construction of hut is that to be found everywhere to the west of the KHO'JA AMRÁN Range. These are square dwellings of mud (kachchá) bricks about 20 feet by 12 feet and some 6 to 8 feet high surmounted by one or more small domes. In this method of construction wood is not required for the roof, a great consideration in a treeless country like South Afghánistan (*vide* fig. 1). But the hut of the Pishin Valley and neighbourhood has a sloped roof (fig. 2) supported on strong rafters, thatched and finally covered with mud. This roof is by far the most valuable part of the structure, and during their numerous migrations they carry away the wood-work to be set up in the new site. The usual measurements of such a hut are roughly: length 18 feet, breadth 6 feet, height of wall 6 feet and of roof 10 feet. They have no windows but usually three small holes at either end for air and smoke. A hut generally stands in a small yard surrounded by a rough stone or mud wall and sometimes there are two or three huts in the same enclosure.

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* Among the Sayads it was to be observed that the articles of dress were not homespun but of foreign manufacture, obtained probably during their many visits to Hindustán.

As the mountainous regions between the Pishin and Shor Valleys are approached, the huts become much rougher though constructed on the same principles. They are irregular structures of mud over foundation walls of large unhewn and uncemented stones from the nearest stream or hill-side, and frequently also the back wall is the hill-side itself. The roof as before is of thatch covered with mud. There is also often a small window hole and the door frequently stands out from the roof on the principle of a dormer window (fig. 5). The general dimensions are height 10 to 12 feet, height of rough stone-work 3 feet, of mud wall 1 to 2 feet, length 10 to 12 feet.

Up in the mountains and in the upper gorge of the R. RO'D the dwellings degenerate into a mere irregular thatch of leaves and brushwood of a pyramidal or conical form supported by a centre pole and having a door or entrance at one side. Frequently a hole is scooped out from the hill-side and thatched in, so as to form a rough kind of hut or dwelling. These conical huts measure generally: height 10 feet, diameter at base 10 feet (*vide* fig. 4).

On reaching the lower lands about O'BUSHTKAI, KHWÁṚA and CHIMJÁN, a hut very similar in appearance to that of the lower RO'D Gorge is to be seen, the roof of which is irregular and of thatch covered with mud and supported on irregular rough stone walls cemented, so to speak, with mud. There is usually no gap for a window (*vide* fig. 8). The measurements are: length about 12 feet, height of wall 3 feet, total height 8 feet.

In the mountainous tract between the SHO'R and ZHO'B valleys the huts are very wretched and have the appearance of being of a temporary character. The floor is scooped out of the ground on the hill-side so as to save a back-wall, and a wall about 3 feet high is built up on three sides surmounted by the usual mud-and-thatch roof. The interior height is about 6 feet and the length some 10 or 12 feet, breadth 6 feet.

But on reaching the GHAZGAI and BO'RAI Valleys, *i. e.*, the territories of the UTMÁN and SANDAR KHE'L Kákars, a notable difference in dwelling structure is observable. The houses, rather than huts, now to be seen are of mud, as in Belochistán, Sind and the Panjáb.* In the GHAZGAI Valley they are all fortified after the fashion of these people, having frequently a look-out tower, which is sometimes square but generally circular, attached to them. The body of the building has the sloped thatch-and-mud roof of the Pishin valley. The entrances or doors are very low, being only 3 feet or so in height; the tower has also a separate entrance of a similar construction, and round the top of it is a row of loop-holes. The usual dimensions are: height of wall 4 feet, of hut 8 feet, of tower 12 feet, base of tower 6 feet square (diameter, if round, 6 feet), length of hut 16 feet (*vide* fig. 9).

In the BO'RAI and LU'NI Valleys were the best dwellings (figs. 10, 11, 13) I saw outside Kandahár in all S. Afghánistán, and I can hardly do better regarding them than repeat what I have elsewhere said.† "They are no longer huts, but have become houses with dimensions varying considerably; fig. 10 represents one of the smaller ones. They are built entirely of mud with flat roofs from which the water is carried by projecting spouts. They are generally fortified and have towers attached and usually only one door. Fig. 11 represents one of these fortified houses. The bulk of the houses, however, in the BO'RAI Valley are much larger than those above mentioned, and may be described as fortified structures of mud, surrounded by a mud wall some 12 feet high and covering sometimes nearly an acre of ground (*vide* fig. 13). They have usually several towers attached and one door; within the outer wall are a quantity of fruit trees, and the house probably contains a whole family. Generally also there is a low 3 foot mud wall extending round the fields belonging to the house probably for their protection. Three or four such houses often constitute a village. The fortifications of an UTMÁN KHE'L village are often supplemented by a small regular square mud fort or redoubt with corner towers. Forts of a similar description are also to be observed about the SANDAR KHE'L and LU'NI Territory, where the villages are generally a straggling collection of the large fortified houses above described. They have a well-built, substantial and prosperous appearance not often seen in the East. Sometimes a MALIK or petty chief will build himself a fort apparently as much for show as anything else. CHINÁ KO'T in the BO'RAI valley (fig. 14) is such a fort. The main interest in it is that it is quite new, not more than 20 years old, and so is a specimen of the modern method of Kákar fortification. It is on a small isolated hillock rising out of the valley, and is constructed as usual of mud on a rough stone foundation. The owner is one MALIK SANDÍ, an ÁLÍZAI SANDAR KHE'L. The approach is by a causeway of very rough construction, and it is entered as usual by a single door so situated as to be easily commanded. The whole structure covers about an acre of ground".

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* In the Panjáb the walls of such a house (kachchá makán) are built simply of wet mud (góṇḍhá) without foundation (bunyád), then smoothed over with liquid mud (kaigal) and finally covered with a wash of cowdung and mud (góbrí) and often also with whitewash (sufédí) or a coloured lime-wash (rang). The roof (chhat) is of rafters (khaṛí) covered with a light reed thatch (sirkí), plastered over with mud or earth (miṭṭhí) and cowdung (góbrí).

† J. R. G. S., 1880.

The nomadic habits of the Duránis and especially of the Achakzai section of that tribe have been frequently noticed by former writers. Among the Kákars, too, are found several nomad sections, such as the SULIMÁN and AMAND KHE'LS of the Pishin and the bulk of the PÁNIZAIS, DUMARS, and ZAKHPE'LS; even the more fixed and agricultural sections of the Kákars, as the SANDAR and UTMÁN KHE'LS, and the LU'NIS have the nomadic instinct strong in them and spend all the hotter weather roaming with their flocks in the neighbouring hills. By far the greater part of the ACHAKZAIS have no fixed abode, but live in a curious kind of hut called a KIZHDAI, which has been thought peculiar to the Duránis, but as far as I could ascertain, it is common to all the nomad sections whether DURÁNI or KÁKAR. The KIZHDAI is a structure of bent willow rods or withies covered over with black felt-like blankets and sometimes with black matting (*vide* fig. 3). There are generally four or five of these willow supports in a row over which the covering is stretched. I saw one in the course of construction near ÁLÍZAI in the Pishin and the method of putting up the supports is that shown in fig. 15. The Kizhdais are very warm in winter and can be made, by opening out the sides, cool and pleasant in summer, and are also, from the closeness of the strands of the covering which swell with moisture, impervious to rain. They have for a nomad race the advantage of being as easily moved as an ordinary tent. In several Kizhdais of a permanent kind near villages I saw a regularly railed in space in the middle for goats and sheep. The usual dimensions are: height 4 feet, length 12 feet, opening or doorway 3 feet by 3 feet.

There are two other kinds of structure which are interesting in this connection. In the BO'RAI valley the SANDAR KHE'LS build small circular mud towers of peculiar make (*vide* fig. 12), raised on piles about 2 feet from the ground, in which they store grain containing as I have elsewhere shown* about enough for five persons for one year. BHUSA (chaff or chopped straw for fodder) is kept in round mud-covered heaps containing about 100 to 200 maunds, as are turnips etc. in England for the winter. Grain of all sorts is also stored in sacks weighing about 100 seers, which are kept in the huts and sometimes buried in some place known only to the owner to save them from the rapacity of the numerous hangers-on of the Sirdárs or of the Amír.

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* J. R. G. S., 1880.

Secondly, Ásyás or watermills are noticeable objects everywhere. Their general features have been frequently before described, as they are common to Afghánistán, Persia and Turkistán, and the following from MacGregor will answer the internal description of them all: "The wheel is horizontal and the feathers are disposed obliquely so as to resemble the wheel of a smoke-jack. It is within the mill and immediately below the mill-stone, which turns on the same spindle with the wheel. The water is introduced into the mill by a trough so as to fall on the wheel. The wheel itself is not more than 4 feet in diameter."* Externally they have always the appearance of the ordinary habitations round them, whatever the prevailing construction may be. They are to be found along the line of a Ku'l or of a natural running stream, and often, to give the water greater power, a portion of the stream will be banked up for some distance before it reaches the mill (fig. 4). The roof is usually on a level with the banks of the stream. In places, as at Álízai in the Pishin, long lines of Ásyás and embankments are to be seen along the same stream (fig. 17).

There is little to be remarked under the head of cultivation beyond a notice of such methods of irrigation, etc., as came prominently under observation, for my journey was of too hurried a nature to admit of any investigation. In irrigation considerable skill is everywhere evinced in S. Afghánistán, especially in the direction of Ku'ls or artificial water-courses, of Káre'zes or underground water-courses, and of groins and river dams. Wells are not seemingly in use for cultivation as in the Panjáb and Persia. The Ku'l is well-known in all the northern districts of India and there is little to be added here, except to notice the general prevalence of this style of irrigation in S. Afghánistán, where along the Tarnak Valley it is used to such an extent as to dry up and disperse the water of the river: a state of things also noticeable along the rivers running towards the Indus and the Kachí Plain of Belúchistán. The entire flow of many mountain streams is frequently thus utilised, and great skill is often to be observed in the preservation of the levels; and in one place in the Bo'rai Valley I observed a Ku'l carried under the stony bed of the R. To'r Khaize' by a rough but practicable syphon.

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* Such watermills are common enough in the Himalayan districts, and I have in my possession a wooden bowl turned by a lathe worked by a water-wheel in a remote valley in Ku'lu'.

The Káre'z has been frequently noticed by travellers in Central Asia beginning with Marco Polo, who, according to Ramusio's version, writes about "the wearisome and desert road in Kermán (Kirmán)", that* "after those days of desert you arrive at a stream of fresh water running underground, but along which there are holes broken in here and there, perhaps undermined by the stream, at which you can get sight of it. It has an abundant supply and travellers worn with the hardships of the desert here rest and refresh themselves and their hearts." Col. Yule remarks on this (p. 116) "the underground stream was probably a subterraneous canal (called Kanát and Káre'z) such as is common in Persia, often conducted from a great distance. Here it may have been a relic of abandoned cultivation". Khanikoff on the road between Kirmán and Yezd, not far west of that which I suppose Marco to be travelling, says: "At the fifteen inhabited spots marked on the map they have water which has been brought from a great distance and at considerable cost by means of subterraneous galleries to which you descend by large and deep wells. Although the water flows at some depth its course is marked upon the surface by a line of more abundant vegetation." Elphinstone says he has heard of such subterranean conduits 36 miles in length." MacGregor describes the construction of a Káre'z thus: "a shaft 5 or 6 feet in depth is sunk at the spot where the stream is to issue on the surface, and at regular intervals of from 20 to 50 or more paces in the direction of the hill, whence it has been previously ascertained that a supply of water will be obtained, other shafts are sunk and the bottoms of all connected together by slightly sloping tunnels. The depth of the shafts increases with their distance from the original according to the slope of the ground. Their number and the length of the Ka're'z depends on the supply of water met with, the quantity required and the distance of the habitable or cultivable spot. The position of the shafts is marked by circular heaps of earth on the surface and their orifices are usually closed, the covering being removed at intervals of a year or more for the purpose of cleaning and repairing the shafts and tunnels. Much experience is required to select a spot from which a plentiful and lasting supply will be obtained. Some Káre'zes afford a constant supply of water for ages whilst others become exhausted before they have paid for the cost of construction." To this I may add the advantage of the Káre'z is the prevention of the rapid evaporation the water would undergo in such a climate if freely exposed to the air. Káre'zes are frequently very deep, 40 feet and more below the surface. Judging from one seen under construction in the Pishin, the shafts or wells are sunk as usual with pick and shovel and with crate and windlass, and the water-passage tunnelled out afterwards. One cause of the permanent drying up of KÁRE'ZES is the shifting of the subterraneous water lodgment, and it is not uncommon to see parallel lines of KÁRE'Z wells close to each other. KÁRE'Z digging is a special occupation, the GHILZAIS being famous for it.

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* Yule's Marco Polo I, 115.

The system of irrigation by tanks or open reservoirs so successfully used in MAISU'R and many parts of the Madras Presidency is only sparingly used in Afghánistán, and I only observed a few small irrigation tanks in the Pishin and KADANEI Valleys, though from the universal presence of uneven country in Afghánistán it would appear that the MAISU'R system of *bands* and tanks should succeed as a means of irrigation if regularly introduced.

The method of irrigation by means of groins and reclamation of river-beds to be observed in the high lands along the valley of the R. RO'D and in the SHO'R Valley in the neighbourhood of CHIMJÁN is very remarkable. These groins are constructed at a great cost of labour with rough stones and tree trunks and are frequently turfed over and planted with willows and small bushes. In the RO'D Gorge the main portion of the cultivable land has been obtained in this way.

There is one more point to be noticed in this connection. Elphinstone states (Kingdom of Kábul) that it seems to be only in the very poorest parts of the country that land is allowed to lie fallow for a year. This, however, is apparently not the case in the Kákar Country generally, especially in the BO'RAI Valley, where the large area under cultivation is only to be accounted for by a large portion of it being allowed to lie fallow every year.

Madder, which, as MacGregor observes, is common in the west of Afghánistán and sold all over India by Paṭháns as MAJÍT or MANJÍT, is to be found in the DO'F Valley in highly cultivated lands deeply furroughed and manured. The leaves are used for cattle and the roots for the dye. This cultivation is elaborate, good and costly, and the yield in the DO'F Valley is said to be worth Rs. 1000. The people there believe apparently that it is not grown elsewhere; it is, however, to be seen about TAKHT-I-PU'L near Kandahár.

Graveyards deserve mention in this place. These are to be found scattered over the land in places quite remote from population. In fact the dead are frequently carried to long distances from their place of decease in order to be buried at a particular spot. This system of carrying the dead to certain places belonging to the family is prevalent among the Panjáb Muhammadans, the YU'SUFZAIS and other such Paṭháns as inhabit British Territory. I saw the body of a SUBAHDÁR of the 26th Panjáb Native Infantry who had died at Quetta being carried down the Bolán Pass to be buried in the Pesháwar District, and on the Panjáb Railways there are special rates and arrangements for the carriage of corpses. On the other hand among the Paṭháns travellers and often the dead on a field of battle are buried where they die, and the GHILZAIS are always so buried. The reason given for conveying corpses to certain burial grounds is, that a Paṭhán should be buried by the tomb of the PÍR or Saint he followed in life, at whatever distance it may be. This accounts for graveyards on the summits of mountains, as on Mt. KHWÁJA AMRÁN in the GWÁJA Pass, and in the TRÍKH KURAM and PÁLKAI Passes miles away from habitations.[*] I was told that parties on the road to and from a burial place were never molested. MacGregor[†] states with reference to the GHILZAIS that it is the custom of the country to throw a heap of stones over a murdered traveller and that the road leading from SHILGHAR to ZU'RMAT the frequency of these heaps is sickening, in many cases being found at the closed ends of ravines, showing that the poor travellers have run as far as possible and then been hewed down. The same remarks would be perfectly true of the long and narrow TO'POBARGH Valley near Mt. MÁZHWÖ in the highlands separating the country of the ZAKHPE'LS and PÁNÍZAIS, a place particularly favourable for such murders, and the large number of such heaps as above described, sometimes three or four together, is horrible to contemplate. This method of forming cairns is common also in the Himalayan Districts, and I have seen GURKHÁS in passing these Paṭhán cairns throw stones on them from sheer habit.

The LU'NIS form little pillars of rough stones to mark the spots of victories over the Belúchis, and several such pillars (fig. 16) are to be found in the HAN Pass and about the Debatable Lands.

As might have been anticipated, of historical remains there are practically none. Indeed such could hardly be expected in a country which has no history to speak of, beyond petty internal squabbling, and no means of constructing buildings on any scale or of durable materials. In the Pishin there is an old ruined fort of the HÁRU'NS (TARÍNS) on a hill called SIRE' KHILA deserted about 60 years ago; and near SAMÁLZAI, not far from KHU'SHDIL KHÁN, a small artificial mound with some fortifications on it like those at Quetta, with which it has probably a similar origin. It is called SPÍN KHILA (White Fort) but has apparently no local history. The only distinctly historical traditions which the Kákars appear to have relate to NÁDIR SHÁH's time, *i. e.*, only a century back, and in the BO'RAI all remains are locally referred to him. In the centre of the Valley a fort of some size built on the same principle as that at Quetta, but not so high and much more extensive, is called Shahr-i-Nádir. It is now deserted and considerably ruined. The principle on which these forts were built is a very sound one in such a country, as the most desirable position from which to watch a valley is from an eminence so situated that all parts of the valley are visible at once, and at the same time that an enemy advancing from the hills must show himself. As it is very seldom that such eminences are natural they had to be constructed where necessary. This is the governing principle in the selection of the sites of Quetta and Kandahár, in fact the attempt to build Kandahár alongside one of the apparently strongly situated hills near it failed as a military measure.

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[*] The ZAKKA KHE'LS, a wild troublesome tribe about the KHAIBAR, who have a bad name, are said to have stolen a saint from the YU'SUFZAIS and murdered him to obtain the PI'R round whose grave they bury their dead. Tradition says that they are such scoundrels, that no man among them could be found whom even they could reverence after death as a saint.

[†] Quoted above in the section on Polity.

In the Bo'rai Valley and along the route thence, *viâ* the Hanumbár, Tríkh Kuram and Han Passes, towards Bárkho'm a remarkable set of remains are found everywhere in the shape of large quantities of pieces of burnt bricks and pottery* of a manufacture and excellence not now known in these parts. These are found in all kinds of places, on the hill tops, in the valleys and passes and alongside streams. The inhabitants say they are the remains of Nádir Sháh's army, but as this was an old Káfila route, the present one *viâ* Mekhtar being not far distant, it is as likely that the presence of the remains is due to this as to Nádir Sháh's march in this direction; it is, however, more than likely that he and his successor Ahmad Sháh, the first Duráni and hero of Pánípat, or portions of their forces made more than one march along this route.

The state of civilization varies considerably with the locality, the inhabitants of the valleys being of course more civilized than their hill neighbours. As has been above observed, the more hilly the country the more scarce and rough the dwellings become, a sure indication of the general civilization of the occupants. The Zarkháns and among the Kákars the Dumars, Zakhpe'ls, Pánízais and Amand Khe'ls bear off the palm for wildness, and their civilization is merely nominal. The Utmán and Sandar Khe'ls present a substantial, though rude, form of civilization of the patriarchal type, as shown in their buildings, their husbandry, their better class of wearing apparel and the quantity of food supply, much of it foreign, which they possess, and the same is true of the Lu'ni Khe'ls. The Kákars of the Do'f and Gwál Valleys resemble their Pishin neighbours in almost everything, even to their habit of visiting foreign countries, and many an Ísá Khe'l or Shamozai Kákar is to be found, who has been in Karáchi and Bombay and even served as a sailor. In the Pishin there are many indications of a superior civilization, notably in the presence of women and children in the villages passed by the army, the knowledge of Hindústání, which is there so frequent as to carry one anywhere through the valley, and the travelling habits of the people. These traits are more specially to be observed among the Pishin SAYADS, than among the TARÍNS, though many of these speak Hindústání fluently, as also can some of the DO'F and GWÁL Valley Kákars. Many of the so-called Paṭháns who travel to all parts of India and even to Burmah selling horses are Pishin Sayads, some of whom make it a yearly practice to do so, keeping regular agents at BANGALU'R (in MAISU'R) and other horse marts. When the field telegraph was first opened at GULISTÁN KÁRE'Z in the Pishin, all private messages had to be countersigned by the Political Agent, whose tent was besieged by applications for telegrams from the Sayads and Taríns, who sent messages to all parts of India, one being addressed to Kandy in Ceylon.

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* Several specimens were sent to this Society by the present writer with the Geological collection he made in the districts under discussion.

VI. *Language.*

My observations under this head were the most unsatisfactory of all, as I was enabled to do little more than observe the variations in the pronunciation of place names.

The language spoken is PUSHTO* in dialects not, however, differing so much from the standard Pushto of our army as to prevent the soldiers from being readily understood. Its most prominent feature, the excessive gutturalness, seen in such words as GHWAZH, UKHMUGHDAI, ZHIZHA TANGAI, is apparently such as is commonly to be found in the language, as also are the harsh cerebral ṭ, ḍ and ṛ, so frequently heard all along the route.†

The next most important feature for the purposes of this paper is the interchange of consonants in place names. Those that came under observation are the following, some of which are doubtless due to local dialectic variation.‡

Changes of J.

into d and z. NGÁNDEH = NGÁNJEH: SYÁJGAI = SYÁDGAI = SÁZDAI.

into zh and y. ZHO'B = JO'B = YO'B.

into z. ZAI (the termination) = ZO'I = JAI = JÍ.

into sh. KHÚSHLÁK = KHUJLÁK.

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* Or PUKHTO. KH (خ) and SH (ش) are convertible sounds in the language.

† This is especially the case in the BO'RAI Valley and in the country approaching the Belóch Border. But this might be due to the propinquity of the Belóchhí dialects in which ṭ and ḍ are very hard.

‡ All such interchanges are valuable for comparing and identifying the names given by various authors to places along the same route.

into ch. Khunchagai = Khuṅjagai.

Changes of Z.

into d. Dargai = Zargai : Manzakai = Mundakai : Sandar Khe'l = Sanzar Khe'l,

into ḍ. To'r Khaize' = To'r Khaiḍe'.

into zh. Zawar = Zhawar : Zadún = Zhadún.

into g. Mulázai = Malagai.

Changes of R and Ṛ.

r into ṛ. Bo'rai = Bo'ṛai : Wariágai = Waṛiágai.

r and ṛ into l. Múltat = Murtat : Kala = Kiṛe' = Kile' : Shnagál = Shnaghar = Shnaghál.

ṛ into ḍ. Khwáṛa = Khwáḍa.

ṛ into zh. Kizhdai = Kiṛdai.

Changes of D.

into g. Angánd = Ngáng = Nigánd : Syájgai = Syájdai.

Changes of G.

into k. Ko't = Go't.

into gh. Shnagál = Shnaghál : Ghwand = Gund : Ghundamarai = Gundamarai.

into kh. Gwája = Khwája.

Changes of KH.

into k. Ksho'i Káre'z = Khsho'i Káre'z.

into gh. Ighbarg = Ikhbarg.

Changes of F.

into v and b. Ísaf = Ísab = Ísav.

Changes of B.

into p. Alab = Álip.

Changes of S.

into sh. Lastai = Lashtai.

Changes of TS.

into ch. Tsamaulang = Chamálang.

Changes of V.

into w. Vata'kri = Wata'kari.

Instances of the loss and addition of consonants are:

of G. Pla'ngzhara = Pla'nzhara.

of D and G. Anga'nd = Niga'n = Nga'ng.

of R. Dumar = Duma' : Bagha'wa = Baghawar.

of K. Lashtai = Lashtkai.

And instances of the transposition of syllables and consonants are:

of R. Surghwand = Sragha'nd.

of Gh. Ghobargai = Oghbargai : Zaghlún = Ghazlún.

of N. Anga'nd = Niga'nd = Inga'nd.

From the above examples it will be observed that the most unstable consonants are J, Z, ZH, R, D, G, KH, F, B, S, TS, and V, with their counterparts SH, CH, ZH, K, GH, B, and W.

Regarding consonantal interchanges peculiar to the Pushto language, Raverty (Gram. Pushto, p. 3) has noticed that kh (خ) is changed into sh (ش), g (گ) into zh (ژ), ts and dz into ch and j. And of the Khaibaris he observes that they so transpose their letters as to be almost unintelligible. In his Dict. of Pushto (xxii) he further notices the interchange of z into dz.

Of vowel sounds I noticed as peculiar an o pronounced in several words as the close German ö, thus, Uzhdö, Ma'zhwö. And also the common termination ai (written by Raverty aey) which is sounded with a closed mouth and sharply as one syllable, though it partakes of the nature of two; thus, aí. The frequent recurrence of this last gives the language an uncouth sound, and, coupled with the prevalence of guttural consonants, an unpleasant harshness to English ears.

The vowel changes are not important, the following being the most noticeable.

Changes of A and A'.

a into i. Angánd = Ingánd: Kazhdai = Kizhdai: Kala = Kile' = Kiṛe': Tsamaulang = Chimálang: Alab = Álip.

a into u. Mulázai = Malagai: Manzakai = Mundakai.

a and á into au. Tsamaulang = Chimalang = Chimálang.

Changes of AI.

into i and o'i. Zai = Zo'i = Zí: Lákai = Lákí: Bo'rai = Bo'rí: Lúnai = Lúní: Dargai = Dargí.

into a. Mangal = Maingal.

Changes of U.

into o. Lúnai = Lo'nai.

Changes of I.

into e. I'saf = E'saf.

Changes of WA.

into au. Waṛía = Auṛía.

into u and au. Ghwand = Gund: Waṛiágai = Uriágai = Auriágai.

into á. Surghwand = Surghán.

into o. Bagháwa = Bagháo.

Among local peculiarities a tendency to shorten and nasalize long vowel syllables was frequently to be noticed, thus—
Amandún for Ámadún: Adinzai for Ádizai: Bánzai for Bázai: Ajjí Khán for Ḥa'jí Khán: Hanumbar = Anubar: Angánd and Ningánd =

NIGA'N: BAHGA'WA = BAGHAWAR: and numerous other instances could be adduced.

The Persian silent w Raverty (Gram. Pushto 4) observes is always sounded in Pushto; thus خواب is pronounced KHWA'B, not KHA'B, خوان; is KHWA'N, not KHA'N. My observations in Kákar-land did not quite bear him out in this; for the following I found to be synonymous pronunciations. AKHUND and AKHWAND: ZARKHA'N and ZWARKHA'N: SURKHWA'B and SURKHA'B, (where the w is a gratuitous insertion, the word being SURKH + A'B, red water): SURGHWAND and SURGHA'N.

Before leaving the vowels a curious insertion of Y in the following word is worthy of remark. CHO'TIA'LI is locally CHO'TA'LAI: ZAKHPE'L and ZAKHPYE'L are synonymous and so are SYA'JGAI and SA'ZGAL.

The following is a list of the various forms under which place names were found by myself and on which the foregoing observations are based.

1. ANGA'ND = NGA'NJEH, NIGA'NJEH, NIGA'N, IṆGAN, NINGA'N, NGA'NG, NIGA'ND, ANGAND, NGA'NDEH.[*]
2. MUZARAI = MZARAI.
3. AJJÍ KHA'N = ḤA'JÍ KHA'N.
4. GWA'JA = KHWA'JA.
5. SKAN = ISKAN.
6. ZAI = JAI, JÍ, ZO'Í.[†]
7. ZHO'B = JO'B, YO'B.
8. Í'SAF KACH = Í'SAB KACH, E'SAB KACH, E'SAF KACH, YÚSUF KACH.[‡]
9. KHARZANGAI = KHABARZANGAI.
10. ALLA'HDA'D = KHA'LAKDA'D.[§]
11. KHÚSHLA'K = KHUJLA'K.
12. KIZHDAI = KIṚDAI, KAZHDAI, KIZHDÍ.[‖]
13. KALA = KILE', KIṚE', KO'Ṛ.[‖]
14. SURKHWA'B = SURKHA'B.
15. KHUNCHAGAI = KHUNJAGAI.
16. GO'Ṭ = KO'Ṭ,[‖]
17. KHSHO'Í KA'RE'Z = KSHO'Í KA'RE'Z.

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[*] JEH is for DEH, a village. These words represent the LÓR ANGÁNO and KÚZ ANGÁNO of the map (DO'F Valley).

[†] To show pronunciations of ai: this is a termination not a word.

[‡] These names arise from the confusion between Í'SAV and YÚSUF (Esau and Joseph).

[§] These words have the same meaning, *viz.* God-given: there is a similarly named village near Kandahár.

[‖] These are not place names.

18. Zhawar = Zawar.
19. Ighbarg = Ikhbarg.
20. Ámadún = Amandún.
21. Ádizai = Adinzai.
22. Zadún = Zhadún.
23. Mangal = Maingal.
24. Ba'zai = Ba'nzai.
25. Surghwand = Surgha'n, Surgha'nd, Sragha'nd, Surghan, Surghand, Sraghand.
26. Shnaga'l = Shnaghar, Shnaghal, Shnagai, Shna' Khorai.
27. Waṛía Kach = Auṛía Kach.
28. Wargai = Bargai.
29. Mula'zai = Malagai.
30. Zakhpe'l = Zakhpye'l = Zakhwai.
31. Ghobargai = Oghbargai.
32. Dumaṛ = Duma'.
33. Sya'jgai = Sya'dgí, Sya'dgai, Sa'zai, Sya'jdai, Sazdai.
34. Khwa'ṛa = Khwa'ḍa, Khwa'ṛ.
35. Zaghlún = Ghazla'na, Ghazlún.
36. Dargai = Zargai, Dargí.
37. Ghundamarai = Gundamarai.
38. Ghwand = Gund.
39. Pla'nzhara = Pla'ngzhara.
40. Surmastaili = Surmasta'li.
41. Baia'nai = Bia'ní.
42. Sandar Khe'l = Sanzar Khe'l.
43. To'r Khaize' = To'r Khaiḍe'.
44. Cho'tia'li = Cho'ta'lai.
45. Bo'ri = Bo'rai, Bo'ṛai.
46. Lashtai = Lastai, Lashtkai.
47. Waria'gai = Waṛia'gai, Uria'gai, Auria'gai.
48. Hanumba'r = Anuba'r, Anumba'r, Hanuba'r.
49. Múltat = Murtat.
50. Lúni = Lo'nai, Lúnai.
51. La'kai = La'kí.
52. Tsamaulang = Chimalang, Chamalang, Chamaulang, Chama'lang, Cha'malang.
53. Alab = Álip.
54. Soba'h = Soba't.
55. Bagha'wa = Bagha'o, Baghawwa'r.
56. Vata'kri = Wata'kari.
57. Zarkha'n = Zwarkhán.

58. To'r Tsappar = To'r Tsupprí.*

59. Paste' = Pasto'.

60. Manzakai = Mundakai.

The frequent recurrence of certain names on the map leads to the supposition that many of them are merely descriptive and on examination the meanings of a great portion become apparent, the descriptive words having changed very little on becoming names of places.† And though it is always treading on dangerous ground to give derivations of place names, I think the following are worth hazarding:

1. Tangai means a gorge or pass, so Spír Tangai would be the White Gorge (Spír for Spín) and Túr Tangai the Black Gorge (Túr for To'r.)

2. Ghunḍ is round, globular and the Ghund Peak would mean the Round Hill, and Mt. Surghwand the Red Round Hill. Again Ghunḍa is a detached hill and Ghundamarai is Adam's apple in the throat, and as applied to a village would mean the village by the round detached hill.

3. Lwa'ṛa means hilly and as applied to a valley would signify the hilly or upland valley.

4. Chor means a ravine or water furrow and is applied to a steep-banked stream in the Pishin.

5. Sire' Khila would be the Inn or Caravanserai Fort. It was the old rendezvous of the Hárún Taríns in the Pishin. This is probably also the meaning of Zara Khila in the Pishin.

6. The Gaz Hills might mean the Long Hills from گز a yard-measure or the Tamarisk Hills from غز a tamarisk.

7. Mzarai means a particular kind of reed and is applied to a river, a valley, and some marshy springs and the hills near these last.

8. Surkha'b is the Red River.

9. Zarghún means green, verdant, fresh and is applied to a range of mountains covered with forest in the heights and to a village by a stream.

10. Lúr means Upper and Kúz, Lower, when found in composition with place-names. Lo'we' and Lo' mean Greater: Kuchnai and Kaun, Lesser.

11. In Mehtarzai, Mehtar is Persian meaning "master, ruler." Mehtarzai would mean the Ruling Clan.

12. Ghwazh means a sluice and also the ear, and is found applied to a stream and a range of the hills, the Spín Ghwazh, (?) the White Ear Hills. Zhwazh means the murmuring of a brook and may be the deriva-

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* A corruption of Kálí Churrí the Belóch name for the same place with the same meaning, *viz.*, Black Rock. Thus Tríkh Kuram is called also So'r Kuram, which has the same meaning, Salt Springs.

† I do not here refer to such purely men's names as Habíbullah, Khúshdil Khán, transferred to the villages owned by the persons of these names.

tion of the river name, whence perhaps also ZHIZHA TANGAI (?) the Rippling Pass.

13. Mt. KAND may derive its name from KAND a chasm or KANDAI broken ground.

14. Mt. PÍL from its fancied resemblance to an elephant, PÍL or FÍL.

15. SHARAN KA'RE'Z and SHARAN occurring two or three times and once as SHE'RÍN, are probably for SHÍRI'N, sweet.

16. SÚR or SURAI is red and is met with in several words. SURAI also means a passage and the so-called SURANA'RI Pass (the SURAI Pass of my maps) is for SURAI NAṚAI, the Slender Passage. Cf. also LA'NDAI SURAI (?) the Lower Passage. MO'MAND SARA'I (?) the Momand's Passage.

17. The word GHBARG, as in OGHBARG, IKHBARG, IHGBARG and in the plural forms GHOBARGAI and OGHBARGAI, occurs several times. It means the flat land between two hills, and upland valley: also double, two, twins. In which latter sense it is probably used when applied to hills. And hence also NARAIGHBARG Hills may mean the Narrow Valley Hills.

18. RO'D means merely a river: RO'DBA'R, a valley stream.

19. KSHAI means in, between, etc. and KSHO'I KAREZ might mean the Middle Káréz.

20. KHWAṚA is probably for KHWAṚA, a sandy stream-bed, as several such beds debouche into the SHOR valley at the spots so named.

21. SAGAR, SRAGHAR, SARGHAR, SURGHAR all common names mean the Red Hills (SUR + GHAR). So the SAGARBAND Pass would be the Red Hills Pass.

22. SURKAI ZANGAL is the Red Forest.

23. DARGAI, a very common name, is the plural of DARGA, a copse, a place where trees and brush-wood grow together. DARGA also means a shrine and this may account for its application to villages.

24. GURKHAI is applied to a mountain stream and its defile and may mean rattling, noisy, as GÁRKAI is the rolling of a carriage and GARKANḌA a rolling stone from a mountain.

25. ZAWAR or ZHAWAR (ZAWAṚ) is a slope, declivity. LWAṚ ZWAṚ is uneven ground. ZHAWAR also means a deep or hollow place.

26. USH or UKH is the camel. The USH Pass means the Camel's Pass, and the UKHMUGHDAI Pass the Camel's Mouth Pass. (UKH + MAKH).

27. UZHDÖ, the name of a peak, is apparently the plural of UZHD, U'ZHD and U'KD, long, lengthy, stretched out.

28. TSA'RU Peak = ? the Look-out Peak.

29. The MO'SAI Pass may derive its name from MO'SAI, a child's marble, a round stone, or from MO'ZI', troublesome.

30. KACH is the cultivation by a stream-bed and is seen not only by itself as a name for a stream, a village and a hill, but constantly in compo-

sition, as Ísaf Kach, Esau's Plot, Ta'zi' Kach, Greyhound Plot, Ko'sh Kach, Crooked Plot, Waṛía Kach, the Free Plot, Súr Kach, the Red Plot, Zagan Kach (?) the Rough Plot.

31. Sho'r which constantly appears as a name is probably for Sho'ra or Kho'ra, saltpetre, nitre: a common property of the soil along the route. It appears again in So'r Kúṛam, the Salt Springs.

32. Shna' Khorai occuring as a synonym for Shnagha'l, a village name, would mean a Mastic Eater.

33. Tri'kh is salt, bitter, and appears in Trikha'dagh, the Salt Hillside, if Da'gh is for Ta'k, or the Salt Plain, if Da'gh is for Da'g: and in Tri'kh Kúṛam, the Salt Springs.

34. Chappar or Tsappar, a corruption of Hind. Chhappar a thatched roof appears as a hill name in Mt. Chappar and in To'r Tsappar, the Black Roof, a hill in the Han Pass. Both peaks have rounded tops. It is worth mentioning here that Tsapa means a wave, billow.

35. Chi'nai is a common village name and is the plural of Chi'na, a spring, fountain.

36. Ghar, a hill, appears in Mt. Spinskhar, the White Hill: Spe'raghar Hills, the Grey Hills: Tang Ghar, the Narrow Hills. Zhar, appearing in several hill names, is probably for Ghar: Zharpitau Peak, the Sunny Peak, Pla'nzhara Hills, the Broad Hills; Zharuband Peak, Hills End, is given to the last hill of a line in the Sho'r Valley.

37. Ispira Ra'gha, the Open Meadow (Spaṛai + Ra'gh); the place is an open spot near Mt. Ma'zhwö. Spaṛai, open, also turns up once or twice as Sapurai.

38. Mt. Surlo' (?) the Red Tablet.

39. Tang To'r Peak, the Narrow Black Peak.

40. Surtak Peak, the Red Precipice.

41. Male'wa Peak (?) The Camel Sack (Malav).

42. La'ndai Peak, the Lower Peak.

43. Pla'n Springs, the Wide Springs.

44. Khúni' Hills, the Bloody Hills.

45. Shaka're'z (?) The Back Káréz and Jalka're'z, the Thorn Káréz; two villages near each other in the Bo'rai valley. Shaka're'z occurs twice.

46. Kutsa or Kucha Valley means perhaps the Little Valley.

47. Tsa'han Wells. Tsa'han is the plural of Tsa', a well, pit. The word appears again as Uchsaha'n Springs. (?) The Upper (új) Springs.

48. Ba'ghu To'r Peak (?) The Black Bogie. Ba'gú is a bugbear, bogie.

49. Ba'la Dha'ka (?) The Upper Plain (ḍa'g).

50. Hanokai is probably a diminutive of Han, the two passes being near each other.

51. Toghai, a river name, is Turkí for a reedy plain.

In a former paper in this Journal* I remarked that a village may be called by six different names by guides, those thoroughly acquainted with the locality would recognise it by any one of them, others less well acquainted will only know it by some of them. Thus a village may be called (1) after the district or tract of land in which it is situated. Takht-i-Púl is such a name, Mel Manda is another; villages 10 miles apart are called Takht-i-Púl and Mel Manda simply because they are situated in the tracts so called. (2) It may be called after the section of the tribe which inhabits it, thus, Ba'rakzai; (3) after the subdivision, thus, Khunse'zai or Mohammadzai, (4) after its late owner if recently dead, (5) after its present owner, thus, Kala-i-núr-ud-di'n Kha'n merely means Núr-ud-di'n Khán's village, and the owner's is usually the proper name of a village, (6) after its own name. To give an example; the village marked Ami'n Kala in my map of the Arghisa'n valley was named to me as Ba'rakzai, Muhammadzai, Ami'n Khan and Lati'f Kha'n. Lati'f Kha'n is its present owner: Ami'n Khan was the late owner, Muhammadzai is the subdivision and Ba'rakzai the section of the tribe inhabiting it. It will be easily seen that the more general terms are known at a distance and the more specific ones only in the immediate neighbourhood of a village. Complicated as this system of nomenclature looks, it is natural enough in a country where the individual occupies such an important place in men's minds and nationality so little. It is not difficult to deal with in practice, after a slight knowledge of the country is acquired, but it accounts for the great apparent discrepancy in names and distances met with on maps and in routes. These remarks are true also of the Tari'n and Ka'kar country. Thus in the Pishin, Gangalzai and Sha'hda'd are names for the same place, and so are Urumzai and Sayad Sa'lo and also Brija'n Kala and Auli'a Kala. Several villages are called Brahamzai, *viz.*, Sayad Do'st Mohammad, Sayad Khama'ndai, Sayad La'l. Three are called Lúr (Upper) Kha'nizai, *viz.*, Mohammad Sa'dik, Vaki'l, and La'l Mohammad and two Bagarzai, *viz.*, Sayad Alab and Sayad Paiyo; two Ya'singzai, *viz.*, Sayad She'rbat and Sayad To'ti. The more specific are the malik's (or owner's) names. In the case of the Brahamzai villages, that of Do'st Mohammad may be called Brahamzai proper, and the same is to be observed of the three Ka'kozai villages in the same neighbourhood, one is called Ka'kozai and the other two also Madat and Áta' Mohammad. On entering the Do'f valley the two villages known in the Pishin by several variations of the word Anga'ng or Ninga'nd are found to be locally Lúr and Kúz Angang, Upper and Lower Anga'ng. Names, however, are more specific in the Do'f, and villages of the same name are distinguished by the tribal name in addition, thus Tlarai (Ísá Khe'l) and

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* Rough notes on the Distribution of the Afghán Tribes about Kandahár. Vol. XLVIII, pt. I, 1879.

Tlarai (Mehtarzai). In the Bo'rai valley, however, Wazia'gai and Khankai seem to be general names for groups of villages and we have two Múrs and two Waha'rs. In the wilder parts names become more general and merely descriptive, everything in the neighbourhood, valley, river, village and hills, all being known by the same name. Such are, O'bushtkai, Khwa'ṛa, Chimja'n, Kach, Baia'nai in the Sho'r valley, and in still wilder regions Nangalúna, To'pobargh, Tri'kh Kúṛam, Tsamaulang and Ba'la Dha'ka. Towards the Belóch Border double names, the Paṭhán and the Belóch are met with, as To'r Tsappar and Ka'li' Chuppri, both of the same meaning, the Black Hill: and Ba'han Kund (Paṭhán) = Bani'wa'la' Kach (Belóch).

Some names are corruptions and abbreviations; such as Sayad Sa'lo and Sa'yad A'tu probably, and perhaps Skan and Iskan for Alexander (Iskandar): Ajji' for Ḥa'ji': Sama'lzai for Isma'ilza'i: Brahamzai for Ibra'himzai: A'lip and Alab for Ḥalab (Aleppo): and perhaps Sopa'nzai for Isfaha'nzai.

In places there seems to be a tendency to call villages after the names of celebrated places, thus we have Di'lai, La'ho'r and Múltat in the Bo'rai valley.

Before leaving this point I would remark that across the Belóch Border in Ba'rkho'm (or Ba'rkha'n) a similar if not a greater confusion of nomenclature exists. Thus the place called Luga'ri' Ba'rkha'n is also called Bangala': Hasni' Ko't = Ta'nkhi Shahr: Cha'he'n = Ba'bul Kha'n ka Ko't or Shahr: Na'ndha' = She'kh Ko't while all the Na'har villages are sometimes grouped as Na'har Ko't, and finally the valley itself is variously called Ba'rkho'm, Ba'rkha'n, Luga'ri Bárkhán, Lúndi'a'n and Kaho.

Having now explained as far as possible the reasons why the nomenclature of travellers[*] along the same route in Afghanistán should differ so greatly, and in order to clear the way for future students of this particular route, I close this paper by a comparison and identification of names found in the journals of other travellers with those to be found in my maps. Included among these are the nomenclature in Capt. Holdich's plane-table sketch-map of the Route and in the Quarter Master General's Departmental sketch-map, and also the names given in Major Waterhouse's paper in this Journal.[†]

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[*] Capt. Heaviside remarks on the difficulty of obtaining Afghán names, in Major Waterhouse's report, pp. 53. J. A. S. B. Vol. XVIII, pt. II, 1879.

[†] The works referred to in the comparison are Notes on the Survey Operations in Afghanistán in connection with the Campaign of 1878-9 by Major Waterhouse, J. A. S. B. 1879. Mackenzie's Routes in Asia, Sec. II, Afghanistán. Macgregor's Gazetteer, Afghanistán, Leech's Route: Dera Gházi Khán to Kandahár. Lumsden's Mission to Kandahár. A more detailed identification of the names along the route will be found in the appendix to my paper in the J. R. G. S. above referred to.

I.—*Han Pass and Neighbourhood.*

Temple.	Macgregor.	Sandeman.	Holdich.	Q. M. G.	Waterhouse.
Ma'ṛ Pass	Ma'ṛ		Ma'ṛ	Ma'r	...
I'sha'ni	I'sa'ni'	...	...	...	...
Da'ka (Ba'rkha'n)	Dakku Ko t		Dakku Kha'n	Dakka	...
To'r Tsappar Ka'li' Chuppri'	Ka'la Chapri' Ka'la Chapr	...	...	...	...
Hanokai Pass	Hanki' Sar	...	Hannokai	Hannakoi	Hanukai.
Kutsa Valley	Kucha	...	...	...	...
Tri'kh Kuram	So'r Kuram	...	Treek Kuram	Trekh Kuram	Trikh Kuram.
Paind Kha'n Ko't	Painden Kha'n Kot' Paindeh Kha'n Luni Paindeh Khán Shahr Paindeh Kha'n Ko't Lúni Paindeh Shahr	...	...	...	...
Ba'la Dha'ka Ba'la Dha'ki'	Ba'la Da'ka	Ba'la Dha'ka	Ba'la Da'ka	Ba'la Da'ka	Ba'lla Da'ka.
Cho'r Tarap	Cho'r Trap	...	...	Cho'r kí Tap	...
Ja'ndhra'n Hills	Ja'ndra'n	...	Ja'ndra'n	Ja'ndra'n	...
Dhaula Hills	Dha'ola	...	Dhowla	Dhowlah	...
R. Ka'han	R. Ka'ha	...	...	...	...
Tsamaulang	Chuma'lang	...	Chama'lang	Chama'lang	Chama'lang.
R. La'kí	R. La'kí Lahar	...	...	...	...
Ba'rkho'm Ba'rkha'n	Ba'rkha'n	Ba'rkha'n	Ba'rkha'n	Ba'rkha'n	Ba'rkha'n.

Temple.	Macgregor.	Sandeman.	Holdich.	Q. M. G.	Waterhouse.
Mitthí Khúín	Mita Koh	...	Han Kúa	Han Ku'a	...
Ba'han Kund	Ba'hanwa'la' Kach	...	...	Ba'hanwa'la'ka'ch	...
Barbúz Hills	Barbo'j Barbo'z Birbo'z	...	...	...	...
Bagha'o	Bagha'o	...	...	...	...
Sraghar (Lúni Valley)	? Shinghar ? Sanghai	...	...	...	...

II.—*Tal, Chótiáli, and Neighbourhood.*

Temple.	Macgregor.	Sandeman.	Holdich.	Q. M. G.	Waterhouse.
Cho'tia'li	Cho'ta'li	Cho'ta'li	Cho'tia'li	Cho'tia'li	Cho'tia'li.
Ko'lu	Ko'lu	Ko'lu	Ko'lu	Ko'lu	...
Tal	Thal	Thal	Tull	Thull	Thal.
Ra'ha	Ra'h Ra'hi	...	Ra'ha	Rehi	Rehi.
Bagha'wa	Bagha'o	...	Bagha'o	Bagha'o	Bagha'o.
Smalan	Smalan	...	Smalan	Smalan	Smalan.
Shinle'z	...	Shinja'zai	Shinlaze	Singlazi	...
Sinza'vai	...	Shinja'vi	Singa'wi	Sanja'wi	Saga'we.

III.—*Bórai Valley and Neighbourhood.*

Temple.	Macgregor.	Holdich.	Leech.	Q. M. G.	Waterhouse.
Bo'rai Valley Bo'rí	Bo'ra Bo'ri	Bho'ri	Bo'ri	Bo'ri	Bo'ri.
R. Hahumba'r Hanuba'r	Anaba'r	Anumba'r	...	Anamba'r	Anamba'r.
Me'khtar	Me'khtar	...	...	...	...
Ninga'nd	Niga'ndh Inga'd	Nimga'n	...	Ninga'n	Ninga'n.
Barminai	Barnamai	Barnemai	...	Ba'memai	...
Me'nd Pass	? Mena	...	...	...	...
Naigwa'l	? Gwa'l	...	...	...	...
R. Lo'ṛalai	Looralaie	...	...	...	...
Shabozai	Shambozai	Shabozai	...	...	...

IV.—*Shór Valley to Pishin Valley.*

Temple.	Macgregor.	Sandeman.	Leech.	Lumsden.	Holdich.	Q. M. G.	Waterhouse.
Dargai (Sho'r Valley)	Dargai Dargí	...	...	Darga'e	Dargai	Dargai	...
China'li	? Chena'ti	...	...	...	China'li	China'li	...
Chimja'n	...	...	Chinja'n	Chinja'n	Chimja'n	Chinja'n	Chimja'n.
Mt. Chapar	Chapr Chaprí	...	...	...	...	...	...
Zagan Kach	...	...	? Sazan	...	...	...	...
R. Surkha'b (Do'f Valley)	...	...	Surkha'b Ford	...	Surkha'b	Surkha'b	...

Temple.		Macgregor.	Sandeman.	Holdich.		Q. M. G.	Waterhouse.
Kach	? Katgah	...	...	...	Kats	...	...
Dumar	Dhumad	...	...	...	Dumar	...	...
Spe'zhandai	...	Spinzandai	...	...	Spe'zandai	Spe'zandai	...
I'saf Kach	Yu'saf Kach I'sab Kach	I'sab Kach	...	...	Yu'suf Kach	Yu'saf Kach	Eusaf Katch.
Ninga'nd Anga'ng	...	Naga'nd	...	...	Anga'nd	Ninga'nd	Ninga'n.
Ka'kar	Ka'kar	Ka'kar	Ka'kur		Ka'kur	Ka'kur	Ka'kar.

V.—*Pishin Valley and Neighbourhood.*

Temple.	Macgregor.	Sandeman.	Holdich.	Leech.	Lumsden.	Q. M. G.	Waterhouse.
Amand khe'l	Sanatya	...	...	...	Simantha	...	...
Sha'hda'd	...	...	...	...	Sha'hda'd	...	...
Kala-i-Abdulla-Kha'n	...	...	Kila Abdulla	...	...	Kila Abdulla Kha'n	Kila Abdulla.
Pishin	Pe'shín	Pe'shín	Pishin	Pe'shín	Pe'shín	Peshin	Pishin.
Kho'jak	Kho'jak	Kho'jak	Kho'jak	Kohjak	...	Ko'jak	Kho'jak.
Barsho'r	Barsho'ra	...	...	Barsho'r	...	...	...
Sayad Paind	Pain Kala	...	Saipa'n Saipain	...	...	Saipa'n	...

A comparison of the names to be found on the three latest maps of this route, namely, those of my own, Capt. Holdich, and the Quarter-Master General's Department, will complete my observations.

From the Pishin eastwards.

Temple.	Holdich.	Quarter-Master General.
Kadanei Valley	Kadanai	Kadanei.
Kho'ja Amra'n Hills	Kho'ja Amra'n	Kho'jeh Amra'n.
Khwa'ja Amran Peak	Kwa'ja Amran	...
Kala Abdullah Kha'n	Killa Abdula	Kila Abdula Kha'n.
Gwa'ja Pass	Gwa'ja	Gwaja.
Tangai	Tangí	...
Kho'jak Pass	Kho'jak	Ko'jak.
Arambi	Arumbi	Arumbi.
Rahamdil Kha'n	Ra'mdil Kha'n	...
Badwa'n	Budwa'n	Badwa'n.
Turkhe'l	Turkhe'l	Turkhail.
Brija'n Kala	Maisai & Paizí	...
Sayad Salo Urumzai	Uramzai	...
Sha'hda'd Gangalzai	Gangalzai	...
Ajabzai	Ajabzai	Ajabzai.
Sayamzai	Se'mzai	Se'mzai.
A'lízai	A'lazai	A'li'zai.
R. To'ghai	To'ghai	...
R. Muzarai	Muzarai	...
Sopa'nzai	Ze'ri'	...
Brahamzai	Brahamzai Brainzai	...
Ma'likai	Ma'lizai	...
Bagarzai	Baggarzai	Bagarzai.
Sama'lzai	Sma'lzai	Sma'lzai.
Sayad Pain	Saipa'n & Saipain	Saipa'n & Pain Kala.
Noa' Ba'za'r	...	Noa' Ba'za'r.
Manzakai	Manzakai	Manzakai.
Kha'nizai	Kha'nzai	Kha'nzai.
She'kha'lzai	Sheikha'ri	Sheikhaha'ri.
Khu'shdil Kha'n	Kushdil	Khushdil.
R. Barso'	Barso	Barso'.
Ma'likya'r	Ma'likya'r	Ma'likya'r.

Temple.	Holdich.	Quarter-Master General.
Kama'lzai	Kama'lzai	Kama'lzai.
Nu'rzai	Na'ria'n	Na'ria'n.
Ya'singzai	Ásimzai	Ásimzai.
Tari'n	Turi'n	Turi'n.
Surai Pass	Surina'ri	Suruna'ri.
Anga'ng	Anga'nd	Ninga'nd.
R. Surkha'b	Surkha'b	Surkha'b.
Mohammad Sharfi	Saria'da Ka're'z	Sarea'da Ka're'z.
Mt. Kand	Kund	Kand.
Mehtarzai	Me'trazai	Me'trazai.
Tlarai	Talarai	Larai.
Murghai	Murgha'	Murgha'.
Sharan	Shiran	...
Nari'n	...	Nari'n.
Balozai Ka're'z	Balozai	Bulozai.
Sa'ghai	Sargai	Sargai.
Sama'wan	Zemirsta'n	Zemirsta'n.
Kha'nizai Ka're'z	Kha'nzai	Kha'nzai.
Shakar	Sakkar	Sakkar.
Zarghu'n Ka're'z	Zergu'n Ka're'z	...
Ksho'ī Káre'z	Kuso'ī	Kuso'ī.
R. Ro'd	To'gai	To'gai.
Gwa'l	Gwa'l	Gwa'l.
Pishin	Pishin	Pe'shi'n.
Mt. Takatu'	Takatu'	Ta'tucka.
Wochakhla	Tura Kala	...
Ukhmughdai Pass	Okhmukhzai	Uchmuchzai.
R. Zadu'n	...	Zerdu'n.
Ámadu'n	Ámadu'n	Ámadu'n.
Mt. Zarghu'n	Zerghu'n	Zerghu'n.
Ka'kar	Ka'kur.	Ka'kur.
Ísaf Kach	Yusuf Kach	Yusaf Kach.
Ush Pass	Ushta'ra	Ushta'rah.
Mt. Mazhwö	Mashkwar	Mashkwar.
Spe'zhandai	Spe zandai	Spe'zandai.
Ispira Ragha	Spiraragha Spiraragh	Spirara'ghah.
Mt. Spinskhar	...	Spinskhar.
Dumar	Dumar	...
Mt. Surghwand	Surkand	Zergu'n.
Zho'b Valley	Zho'b	Zho'b.

Temple.	Holdich.	Quarter-Master General.
Nangalu'na Pass Mo'mand Sara'i Mo'mand	Mo'mandgai	Mamanagi.
O'bushtkai	O'boskoi	O'boskoi.
Chimja'n	Chimja'n	Chinja'n.
Pa'lkai Pass	Pa'lki'	Pa'lki'.
Warghas	Wergus	...
Hindu Ba'gh	Hindu Ba'gh	Hindoo Ba'gh.
Gurmai	Gurmi'	Gurmi'.
Mt. Matkhilar	Mashkhilar	Mashkilar.
Mt. Sya'jgai	Sia'sgai	Sia'sgai.
Dargai	Dargai	Dargai.
China'li	China'li	China li.
Sungalu'n	Shundlu'n	Shu'n Lu'n.
Ka'sai Hill	Mana'ra	Mana'ra'.
Kach	Kats	Kats.
Baia'nai	Bia'ni	Bia'ni.
Sarkai Zangal	Skaijangal	Skaijangal.
Ninga'nd	Nimga'n	Ninga'n.
Ghobargai Hill	Gobargi'	Gobargi'.
Smalan	Smalan	Smalan.
Sinzawai	Singa'vi	Sanja'vi.
Shinle'z	Singlaze	Singlazi.
Bagha'wa	Bagha'o	Bagha'o.
Jalka're'z	Ka're'z	Ka're'z.
Shaka're'z	Shahka're'z	Shahka're'z.
To'r Khaize' Hills	Durgainni Darmangarh	Durgunny.
Lâshtai	Lashtai	Lushtai.
Waria'gai	Uriasgai	Uriagai.
Zangiwa'l	Zangiwa'l	Zangiwa'l.
Khankai	Konkai Chaplai	Konkai. Chaplai.
Ro'dli'n	Kudisai	...
Navgivya'la	Malaiyam	Malaian.
La'ho'r	La'hor	Lahore.
Di'lai	Delhi	Delhi.
Mu'ltat	Mudduk	Mudduh.
Dargai	Dargai	Dargai.
Shabozai	Shabozai	Shabozai.
Sharan	Sho'ra'n	Shora'n.

Temple.	Holdich.	Quarter-Master General.
BARMINAI	BARANMAI BA'MEMAI	BAMEMAI.
DA'LO'R	DALU'R	DALUR.
SAGHARAI	SAGRE'	SAGRE'.
CHINA' KO'T	CHINNA	CHINNA.
KACHAI	KATSAI	KATSAI.
KANA'	KHANA	KHANA.
KACH	KATS	KHAS.
SHARAN	...	SHORAN.
SHA'BA'N	SHAMURLAK	SHAMARLAK.
KAUN WAHA'R	AWAHA'R	AWA'HAR.
KURU	KHRU	KHURU.
HANUMBA'R	ANUMBA'R	ANAMBAR.
GADIWA'R	GADBA'R	GADBAR.
SARGHAR Peak	TATRI	TATARI.
LU'NI	LU'NI	LU'NI.
SHAUGWA'L	SHAHGOLAI	SHAHGOLAI.
TRI'KH KURAM	TREKH KURAM	TREKH KURRAM.
RAHA	RAHA	REHI.
TAL	TULL	TAL.
CHO'TIA'LI	CHO'TIA'LI	CHO'TIA'LI.
KO'LU	KO'LU	KO'LU.
BRAHAMZAI KHELA'T	PA'RAMZAI	BA'RAMZAI.
MA'R Pass	MA'R	MA'R
TSAMAULANG	CHAMA'LANG	CHAMA'LANG.
HANOKAI Pass	HANNOKAI	HANNAKOI.
BA'LA DHA'KA	BA'LADA'KA	BA'LLADA'KA.
MITTHI' KHU'I'N	HANKU'A	HANKU'A.
HAN Pass	HAN	HAN.
JA'NDHRA'N Hills	JA'NDRA'N	JA'NDRA'N.
CHO'R TARAP	...	CHO'R KI' TAP.
BA'HAN KUND	...	BA'HANWA'LA' KACH.
CHAPAR Hills	CHAPAR	CHAPAR.

On the Súryaprajñapti.—*By* DR. G. THIBAUT, *Principal, Benares College.*

PART II.

(*Continued from* p. 127.)

Although ancient Indian astronomy was chiefly interested in the moon and although the greater part of the Súryaprajñapti treats of her, especially of the places she occupies at different times in the circle of the nakshatras, a detailed connected account of her motions is not given anywhere, and we must combine the hints we meet with here and there, in order to understand the theory by which the old tírthankáras tried to explain to themselves her motion. In doing this we are of course greatly aided by the full and unambiguous account given of the sun's motion, since it will not be presuming too much that the theory which had been applied to the one luminary would be applied to the other one also. As we have seen above, the sun's daily apparent motion is regarded to be his true one and considered to take place round Mount Meru; his yearly motion is the consequence of his moving more slowly than the stars; his motion in declination is the result of his describing round Mount Meru circles of varying diameter. All this is applied to the moon too. The moon describes (or the two moons describe) circles round Mount Meru at the height of eight hundred and eighty yojanas above the earth, so that her place is eighty yojanas above that of the sun. She moves slower than the stars and slower than the sun; while the latter describes during one yuga 1,830 (or strictly speaking 915) circles, the moon describes only 1,768 (or again on the assumption of two moons 884) such circles; the difference of the two numbers = 62 indicates the number of times the moon enters into conjunction with the sun. During the same period, *viz.*, the quinquennial yuga, the moon completes sixty-seven sidereal revolutions. Each of these revolutions is, analogously to the sun's revolutions, divided into two ayanas, an uttaráyaṇa and a dakshiṇáyana, according as the moon is proceeding towards the north or the south (of the equator as we should add). In reality, it is true, the motion of the moon is much more complicated, as it is not only oblique to the equator, like the ecliptic in which the sun is moving, but also inclined to the ecliptic itself at an angle of about 5°, while moreover at the same time the points in which the moon's path cuts the ecliptic are continually receding. One of the consequences of the revolution of the nodes did, as we shall see below, not escape the observation of the author of the Súryaprajñapti, but he was manifestly unable to account for it by a modification of his theory. According to him the moon, like the sun, simply describes concentric circles round Mount Meru, sometimes approaching it sometimes receding from it. While, however, the period of the sun's progress from and towards Mount Meru comprises one year—the time which the sun employs in arriving again at the same star—the corresponding period of the moon embraces one nakshatra month = 27 days, 9 $\frac{27}{67}$ muhúrtas. From this it is easy to find the number of the circles the moon describes. She performs during one yuga 1,768 complete revolutions, consequently during one nakshatra month $\frac{1768}{67} = 26\frac{26}{67}$ revolutions, and during one ayana or sidereal half month $13\frac{13}{67}$ revolutions. The moon therefore proceeds towards the north during the time which she wants for describing $13\frac{13}{67}$ circles, and after that she proceeds towards the south for the same length of time. From this it follows that, while the sun has 184 different circles to describe, the moon has fifteen such circles only. At the beginning of the yuga she leaves the outermost circle and begins her uttaráyaṇa, describes the thirteen circles intermediate between the outermost and the innermost ones and enters into the fifteenth (innermost) circle, through $\frac{13}{67}$ parts of which she passes. After that the sidereal half moon has elapsed, and the moon has to retrace her steps towards the south. She therefore leaves the innermost circle unfinished, returns into the next one, passes again through the 13 intermediate circles and enters into the 15th (outermost) circle. After she has passed through $\frac{13}{67}$ parts of the latter, the sidereal half moon is again over and the progress towards the north recommences. Thus the moon moves in 15 circles of different diameter, but only 13 she passes through in their entirety while a fractional part only of the two exterior circles are touched by her. We have seen above that the vikampa-kshetra of the sun, *i. e.*, the extent to which the sun moves sideways in his northern and southern progress is estimated at 510 yojanas ($= 183 \times 2\frac{48}{61}$; the latter quantity being the amount of the daily vikampa) ; the vikampa-kshetra of the moon is estimated at nearly the same amount, *viz.*, $509\frac{53}{61}$ yojanas (it has been already remarked that the inclination of the moon's path to the ecliptic is not known to the Súryaprajñapti). The diameter of the moon herself is estimated at $\frac{56}{61}$ yojanas, the interval between consecutive circles described by the moon at $35 + \frac{30}{61} + \frac{4}{7 \times 61}$ yojanas ; the sum of these two quantities is $36 + \frac{25}{61}$

$+ \frac{4}{7 \times 61}$, which multiplied by 14, gives the above stated amount $\left(509 \frac{53}{61}\right)$ as the whole vikampakshetra during one lunar half month. Here—as likewise above with reference to the sun—the Súryaprajñapti does not directly speak of the diameter of the moon, but of the measure of the breadth of the circle described by the moon; but the two things come to the same. The manner in which the moon, after having completed one of her circles, passes over into the next one is not expressly detailed; we must imagine it similar to that of the sun.

In connexion with this account of the moon's motion, the Súryaprajñapti enters into a curious calculation, of no practical, and it can hardly be said any theoretical interest, which, however, may be mentioned here as a specimen of the accuracy with which the system is worked out into its minutest details. The question is raised: what circles are common to the sun and moon and how far are those of the moon's circles which belong to the sun also touched by the latter? As the moon's circles are elevated above those of the sun by the amount of eighty yojanas, strictly speaking not any circle is common to both; common to both are, however, said to be those circles of the moon which when projected upon the plane in which the sun describes his circles partially or entirely coincide with the latter. The vikampa-kshetras of the two being nearly equal, while 15 circles of the moon correspond to 184 circles described by the sun, the consequence is that the by far greater portion of the sun's circles do not coincide with the moon's circles, but fall into the wide intervals separating the latter, one from another. Thus for instance the first (innermost) circle of the sun coincides with the first circle of the moon, so that when both luminaries move in their innermost circles their distance from Mount Meru is equal; only the circle of the moon overlaps that of the sun by $\frac{8}{61}$ yojanas, this being the difference of the breadth of the circles described by the two (of the diameters of the two bodies). The next twelve circles of the sun all fall into the interval between the first and the second circle of the moon; for this interval (plus the overlapping $\frac{8}{61}$ of the first circle) amounts to $35 + \frac{38}{61} + \frac{4}{7 \times 61}$ yojanas, while the vikampa-kshetra of twelve solar circles amounts to $33 \frac{27}{61}$ yojanas only. After that two yojanas are occupied by the interval between the 13th and the 14th solar circles, and then the fourteenth solar circle begins, which therefore partly coincides with the second lunar circle. By continuing these calculations for all lunar circles, it is found that the first up to the fifth inclusive, and again the eleventh up to the fifteenth inclusive are "súrya-sammiśráṇi," *i. e.*, partly coincide with solar circles, while the sixth up to the tenth do not coincide with solar circles, the latter falling entirely into the intervals between the named lunar circles. To reproduce here all the details of the calculation would be purposeless.—That the preceding account of the moon's motion agrees with the ideas of the author of the Súryaprajñapti is to be concluded from the formulas given in different parts of the work for the performance of certain calculations. Thus for instance the question is raised, in what ayana and what circle each parvan takes place, *i. e.*, how many ayanas have elapsed at the different times when the moon enters into conjunction or opposition and in which of the fifteen circles she is moving just then. This question is answered by some ancient gáthás quoted in the commentary, according to which the calculation has to be made as follows. The constant quantity—the ध्रुवराशि—which is to be used for the calculation of each parvan, is equal to $1 + \frac{4}{67} + \frac{9}{31 \times 67}$, *viz.*, of one of the circles described by the moon. This quantity is of course easily found by the following consideration. The moon which describes in one yuga 1,768 circles describes in one parvan $\frac{1768}{124} = 14\frac{8}{31}$ circles and in one ayana $13\frac{13}{67}$ circles; the difference of these two quantities is the above mentioned constant quantity. The rule for finding the places of the parvans is now as follows: The way accomplished by the moon during one parvan being equal to the way accomplished during one ayana plus $1 + \frac{4}{67} + \frac{9}{31 \times 67}$ circles, take at first as many ayanas as the number of the parvan whose place is wanted indicates, multiply then the constant quantity by the number of the parvan, and if the result exceeds $13\frac{13}{67}$, deduct it from this latter quantity (which subtraction if necessary has to be repeated until the remainder is less than $13\frac{13}{67}$); as often as this subtraction is performed as many unities are to be added to the number of ayanas found above and—unless the subtraction leaves no remainder—one additional unity is to be added; add two to the remainder; the resulting sum will indicate the circle in which the moon stands at the parvan. Regarding this latter point it is to be remembered that the circles are to be counted from the innermost circle when the number of the parvan is an even one and from the outermost circle when it is an odd one. To illustrate this let us take one of the many examples given by the Commentator. Required the place of the moon at the fourteenth parvan. Multiply at first one by fourteen, that means: fourteen ayanas have elapsed at the time. Then multiply $1 + \frac{4}{67} + \frac{9}{31 \times 67}$ by fourteen; the result is $14 + \frac{56}{67} + \frac{126}{31 \times 67} = 14 + \frac{60}{67} + \frac{2}{31 \times 67}$. This is the number of circles which the moon has passed through during fourteen parvans in addition to fourteen ayanas. As this number exceeds the number of circles passed through in one ayana $\left(\textit{viz.}, 13\,\frac{13}{67}\right)$, the latter number has to be deducted from it and one has to be added to the number of ayanas. So we see that the moon has performed 15 ayanas at the end of the 14th parvan. The remainder left after the above deduction shows the number of circles which the moon has passed through in addition to the 15 complete ayanas; in our case these amount to $1 + \frac{47}{67} + \frac{2}{31 \times 67}$. As there is an excess above 15 complete ayanas, we have according to the rule to add one to their number, *i. e.*, the parvan takes place in the sixteenth ayana. And since the moon enters at the beginning of the ayana into the second circle (the circles being counted from the innermost as well as the outermost) and since in our case the moon has completed more than one full circle, two has to be added to the number of circles found above in order to obtain the ordinal number of the circle in which the moon stands at the expiration of the 14th parvan. The full answer is therefore: the 14th parvan takes place in the sixteenth ayana, in the third circle (reckoning from the innermost circle), $\frac{47}{67} + \frac{2}{31 \times 67}$ of this circle having already been passed through. In the same manner the places of all other parvans may be easily found; the commentator gives the places of parvan I—XV; but it would serve no purpose to extract them here. What has been given will suffice to justify the hypothetical account of the moon's motion detailed above.

The question regarding the relative velocity of sun, moon and stars which is raised in the 15th book finds its answer in accordance with the general principles of the system. The apparent daily motion being considered as the real one, it follows that the nakshatras travel faster than the sun, and the sun again faster than the moon; the space passed through by each of these bodies during a month, day, muhúrta, etc. is calculated and exhibited in detail; we need, however, only remember that the sun describes in one yuga 1,830 circles, while the moon describes only 1,768 and the nakshatras—through whose circle the sun passes five times—describe 1,835. From these relations all special values can be easily derived. It is just mentioned—no details being given—that the planets (graha) travel faster than the sun and the stars (táráḥ) faster than the nakshatras. It is needless to discuss the former of these two assertions; the latter is of course entirely indefensible and no reason leading to it can well be imagined. This is the only time that the stars—excluding the nakshatras—are mentioned in the Súryaprajñapti as far as we can judge from the commentary.

The next point to be considered is the information the Súryaprajñapti furnishes with regard to the nakshatras. Incidentally it has already been remarked that the number of the nakshatras is invariably stated as being twenty-eight, and that the nakshatras are as invariably treated as being of different extent. The particulars are as follows:

According to their extent or, to look at it from another point of view, according to the time during which sun and moon are in conjunction with them, the nakshatras are divided into four classes. Firstly, those with which the moon is in conjunction during one ahorátra = thirty muhúrtas; to this class belong Revatí, Aśviní, Kṛittiká, Mṛigaśiras, Pushya, Maghá, Púrvaphálguní, Hasta, Chitrá, Anurádhá, Múla, Púrváshádhá, S'ravaṇa, S'ravishṭhá, Púrvabhádrapadá. The one ahorátra for which the conjunction lasts may be expressed as $\frac{2010}{67}$ muhúrtas, the convenience of which expression will appear at once. The second division comprises those nakshatras which are in conjunction with the moon for half a nycthemeron = fifteen muhúrtas = $\frac{1005}{67}$ muhúrtas; to this division belong S'atabhishaj, A'sleshá, Bharaṇí, Jyeshṭhá, A'rdrá, Svátí. To the third division belong those nakshatras with which the moon is in conjunction for one and a half nycthemeron = 45 muhúrtas = $\frac{3015}{67}$ muhúrtas; these nakshatras are Uttaráshádhá, Uttaraphálguní, Uttara-bhádrapada, Punarvasu, Viśákhá, Rohiṇí. The fourth division comprises one nakshatra only, *viz.*, Abhijit, with which the moon is in conjunction for $9\frac{27}{67} = \frac{630}{67}$ muhúrtas. We see now for what reason the time of conjunction has been expressed throughout in sixty-sevenths of a muhúrta; it was done for the purpose of obtaining homogeneous expressions for all nakshatras. At the same time these fractions furnish us with an easy means for calculating the time during which the sun is in conjunction with each nakshatra; for five revolutions of the sun occupying the same time as sixty-seven revolutions of the moon, we have only to replace the denominator of the above fractions by five. The result of this operation having been turned into nycthemera, we find as the expression for the time during which the sun is in conjunction with the nakshatras of the four divisions the four following terms: 13 days, 12 muhúrtas; 6 days, 21 muhúrtas; 20 days, 3 muhúrtas; 4 days, 6 muhúrtas.—According to the space the nakshatras occupy they are either samakshetra, occupying a mean (medium) field or apárdhakshetra, occupying half a field or dvyardhakshetra, occupying one field and a half. There is no special name for the extent of Abhijit.

In connexion with this division of the nakshatras into different classes according to the space they occupy or the time during which they are in conjunction with the moon, there is another one referring to the time of the day or the night at which they enter into conjunction. This classification is, however, connected with considerable difficulties. It is nowhere clearly stated on the conjunctions of what particular month this division is based; that such a statement ought to have been given, appears from the consideration that the periodical month during which the moon passes through all nakshatras comprises 27 days plus $\frac{27}{67}$ days, and that therefore in the second, third, fourth, etc. months the times at which the moon enters into conjunction with the single nakshatras will all differ from the times of the first month. If for instance the moon at the beginning of the first month enters into conjunction with Abhijit in the early morning, she will at the beginning of the second month again enter into conjunction with it 9 $\frac{27}{67}$ muhúrtas later, that is, in the afternoon and so on. Other difficulties will appear from the following detailed reproductiou of the Súryaprajñapti's account concerning this point. The nakshatras are either "púrvabhága" *i. e.*, such as enter into conjunction with the moon during the forenoon; or "páschádbhága" *i. e.*, such as enter into conjunction during the afternoon or "naktambhága" *i. e.*, such as enter into conjunction during the night or "ubhayabhága" which term will be explained further on. The nakshatras of the two first classes are the samakshetras, those of the third class the apárdhakshetras, those of the fourth class the dvyardhakshetras. It certainly does not appear why the samakshetras should enter into conjunction with the moon during the day only and the apárdhakshetras during the night only; in reality there is no connexion between the extent of a nakshatra and the time when the moon enters into it. Let us, however, follow the detailed statements about each single nakshatra. The first aphorism of the Súryaprajñapti appears to be "Abhijit and S'ravaṇa are paśchádbhága samakshetra." To this the commentator rightly objects that Abhijit is neither samakshetra, since it occupies only 9 $\frac{27}{67}$ muhúrtas of the moon's periodical revolution, nor paśchádbhága, since at the beginning of the yuga the moon enters into conjunction with it in the early morning. At the same time he tries to obviate these objections by remarking that Abhijit is called samakshetra and paśchádbhága, because it is always connected with S'ravaṇa to which both these attributes rightly belong, or that it may be called paśchádbhága with a view to conjunctions other than the first one which may take place in the course of the yuga. But these both attempts at reconciling contradictions are very unsatisfactory. Howsoever this may be, the commentator goes on to explain that Abhijit and S'ravaṇa, after having finished their conjunction with the moon, hand her over to Dhanishṭhá at evening (Abhijit-śravaṇo dve nakshatre sáyam-samayád árabhya ekám rátrim ekam cha sátirekam divasam chandreṇa sárddham yogam yuktaḥ etávantam kálam yogam yuktvá tad-anantaram yogam anuparivartayataḥ átmanaś chyávayataḥ yogam chánuparivartya sáyam divasasya katitame paśchádbháge chandram dhanishṭháyáḥ samarpayataḥ). For this reason Dhanishṭhá also is paśchádbhága. After having been in conjunction with it for thirty muhúrtas the moon enters S'atabhishaj at the time when the stars have already become visible (parishphuṭanakshatramaṇḍalávaloke); S'atabhishaj is therefore naktambhága. How S'atabhishaj enters into conjunction at night, while exactly one ahorátra before Dhanishṭhá has been said to enter into conjunction during the afternoon, is not explained. S'atabhishaj being apárdhakshetra, the moon remains in conjunction with it for fifteen muhúrtas only and enters on the next morning into conjunction with Púrva-proshṭhapada, which being samakshetra remains in conjunction during one whole ahorátra. On the following morning the moon enters Uttara-proshṭhapada, which therefore would be púrvabhága. But the matter is looked at in a different light, Uttara-proshṭhapada is dvyardhakshetra, *i. e.*, remains in conjunction for 45 muhúrtas. If we now deduct from this duration the fifteen first muhúrtas and imagine Uttara-proshṭhapada to be samakshetra, the conjunction of the moon with it—looked at as samakshetra—may be said to take place at night and in consequence one—the real—conjunction taking place during the day and the other—the fictitious one—taking place at night the nakshatra is called ubhayabhága (idam kilottarabhádrapadákhyam nakshatram uktaprakáreṇa prátaś chandreṇa saha yugam adhigachchhati, kevalam prathamán pañchadaśa muhúrtán adhikán apaníya samakshetram kalpayitvá yadá yogaś chintyate tadá naktam api yogo 'stíty ubhayabhágam avaseyam). Uttarabhádrapada remains in conjunction for one day, one night and again one day, on the evening of which the moon enters Revatí; Revatí is therefore paśchádbhága. After it has remained in conjunction for one nychthemeron the moon passes into Aśviní at evening time. Aśviní is therefore likewise paśchádbhága. From it the moon passes on the next evening into Bharaṇí, at the time, however, when the stars have become visible and night may be said to have begun; Bharaṇí is therefore naktambhága. Being at the same time apárdhakshetra, the moon leaves it on the next morning to enter Kṛittiká, which therefore is púrvabhága. On the next morning the moon enters Rohiṇí which is dvyardhakshetra and, on account of that, ubhayabhága. Mṛigaśiras which she enters forty-five muhúrtas later at evening is paśchádbhága; Árdrá which enters into conjunction thirty muhúrtas later, at the time when the stars have come out, is naktambhága; Punarvasu into which the moon enters on the next morning, being dvyardha, is ubhayabhága. Pushya comes into conjunction on the evening of the following day and is paśchádbhága; Áslesha thirty muhúrtas later, when the stars have come out, and is naktambhága; Maghá and Púrvaphalguní into which the moon enters on the mornings of the two following days are púrvabhága; Uttara-phalguní which comes into conjunction on the morning after that is ubhayabhága, because it is dvyardhakshetra. Hasta and Chitrá enter into conjunction on the evenings of the two following days, before night has set in, and are therefore paśchádbhága. Then again follows one naktambhága nakshatra, *viz.*, Sváti which enters into conjunction after nightfall, and upon this a dvyardhakshetra and consequently ubhayabhága nakshatra, *viz.*, Viśákhá. Then Anurádhá paśchádbhága, after this Jyeshṭhá, apárdhakshetra and naktambhága, remaining in conjunction from nightfall to the morning only; after this two samakshetra and púrvabhága nakshatras, *viz.*, Múla and Púrváshádhá. And finally Uttaráshádhá, which enters into conjunction on the morning, is, however, as a dvyardhakshetra, reckoned among the ubhayabhága. It remains in conjunction for one nycthemeron and the following day, in whose evening the moon arrives at Abhijit whence she had started a (periodical) month ago.

The difficulties involved in all the preceding statements are increased by an assertion made in another chapter of the Súryaprajñapti, *viz.*, that no nakshatra always enters into conjunction with the moon at the same time of the day. This is indeed true, but it contradicts the preceding statements. It may be that this whole classification of the nakshatras according to the time of the day at which they enter into conjunction with the moon is a remainder of an earlier stage of knowledge, when the periodical month was supposed to last just twenty-seven days without an additional fraction, and when it therefore was possible to assign to each nakshatra one fixed hour at which it entered into conjunction during each periodical revolution of the moon. It is true that actual observation would speedily have shown the error of such an assumption, but this remark would apply to almost all hypotheses of the Indians of that period, and we may therefore suppose that in this point too the desire of systematizing prevailed during a certain period over the testimony of the eyes. Later on when the duration of the periodical month had become better known, the old classification lost its foundation entirely and ought to have been dropped; but through the force of custom it maintained its place and was justified some how, although not with the best success, as we have had occasion to observe above.

On the places of the nakshatras with regard to the moon we receive the following information (X. 11). Six nakshatras, *viz.*, Mṛigaśiras, A'rdrá, Pushya, A'śleshá, Hasta, Múla always stand to the south of the moon whenever she enters into conjunction with them. Twelve nakshatras—Abhijit, S'ravaṇa, Dhanishṭhá, S'atabhishaj, Púrva-bhádrapadá, Uttara-bhádrapadá, Revatí, Aśviní, Bharaṇí, Púrva-phálguní, Uttara-phálguní, Sváti always stand to the north of the moon. Seven nakshatras—Kṛittiká, Rohiṇí, Punarvasu, Maghá, Chitrá, Viśákhá, Anurádhá—sometimes stand to the north of the moon entering into conjunction with them; sometimes, however, the moon enters into conjunction with them "pramardarúpeṇa" *viz.*, in such a manner that she passes right through them. To this class, the commentator remarks, some teachers holding an opinion different from that of the Súryaprajñapti add also Jyeshṭhá. Two nakshatras, *viz.*, the two A'sháḍhas stand at the time of conjunction either to the south of the moon or the latter passes right over them. Both these nakshatras consist of four stars each, two of which are situated inside, *viz.*, to the north of the fifteenth circle of the moon, while the two remaining ones are placed outside, *viz.*, to the south of the same circle. Now whenever the moon enters into conjunction with either of the two nakshatras, she passes right between the former pair of stars and may therefore be said to be in conjunction "pramardarúpeṇa." Finally one nakshatra, *viz.*, Jyeshṭhá, always enters into conjunction with the moon pramardarúpeṇa. Regarding the relation of the nakshatras to the fifteen circles of the moon, the following statements are made. Eight circles always are "undeprived" (avirahitáni) of nakshatras. The twelve nakshatras mentioned above, beginning with Abhijit, are in the first circle*; in the third circle there are Punarvasu and Maghá; in the sixth, Kṛittiká; in the seventh, Rohiṇí and Chitrá; in the eighth, Viśákhá; in the tenth, Anurádhá; in the eleventh, Jyeshṭhá; in the fifteenth, Mṛigaśiras, A'rdrá, Pushya, A'sleshá, Hasta, Múla and the two Asháḍhás. For although the first six of the last mentioned class in reality move outside the fifteenth circle, they are—the commentator says—so near to it that they may be said to be in it. In order to form a right estimate of the meaning and the value of these statements, we must recall to our mind what has been remarked above about the Súryaprajñapti's theory of the moon's motion. The moon is supposed to proceed alternately towards the south and the north in the same way as the sun does, following—as the Súryaprajñapti seems to assume—the same path; that she in addition to the movement in declination has a movement in latitude, and that the points in which her orbit cuts the ecliptic are continually receding is ignored, theoretically at least, although it had been observed that the position of the moon with regard to some nakshatras is different at different times, that she sometimes passes on the north or south-side of a constellation and at other times moves right through it. Now comparing the particulars with the information given about the position of the nakshatras in the Siddhántas, we find that the Súryaprajñapti agrees with the latter with regard to five out of the six nakshatras said always to stand south of the moon (Mṛigaśiras, A'rdrá, A'śleshá, Hasta, Múla), the latitude of all of them considerably exceeding the highest latitude the moon ever reaches. The case lies differently with regard to Pushya, which according to the Siddhántas lies in the ecliptic, so that it almost appears as if the Pushya of the Súryaprajñapti were an altogether different asterism. From among the twelve nakshatras said to stand always north of the moon ten (Abhijit, S'ravaṇa, S'ravishṭhá, Púrva-Bhádrapadá, Uttara-Bhádrapadá, Aśviní, Bharaṇí, Púrva-Phálguní, Uttara-Phálguní, Svátí) may be identified with the nakshatras of the Siddhántas whose latitudes—excluding Abhijit—vary from 9° to about 39° north. Strange it is only that these nakshatras occupying a zone of about 21° breadth are said to be in one and the same circle of the moon, and still stranger that Abhijit too is classed among them, the latitude of the latter—if identical with the Abhijit of the Siddhántas—exceeding the latitudes of the other nakshatras, with which it is here thrown into one class, by about 30°. The S'atabhishaj and Revatí of the Siddhántas are situated in and close to the ecliptic; here too therefore we might doubt if the Súryaprajñapti denotes by these two names the same stars as the Siddhántas. The remaining nakshatras may be identified with those of the Siddhántas, the latitude of none of the latter much exceeding the greatest latitude reached by the moon; a considerable margin must of course be allowed for the inaccuracy of the observations on which the statements of the Súryaprajñapti are based. Quite unfounded is the statement about the moon always passing right through Jyeshṭhá; it looks as if it had originated at some period when one of the moon's nodes had about the same longitude as that asterism.

The order of succession of the nakshatras is treated in X. 1. Of five different pratipattis regarding this point the author details only one, *viz.*, that one according to which Kṛittiká stands first. The author of the Súryaprájñapti for his part calls Abhijit the first nakshatra, since according to his system at the beginning of the yuga on the day of the summer solstice early in the morning the moon which is full at that time stands in Abhijit. He therefore altogether abandons the principle, sometimes followed, according to which the enumeration of the nakshatras begins with that nakshatra in which the sun stands on the day of the vernal equinox; if he too had chosen this principle he would of course have begun his enumeration with Aśviní. It may here be mentioned by the way that the Súryaprajñapti does not occupy itself at all with the equinoxes, the name of which is not even mentioned in the whole work.

We now proceed to consider some specimens of the numerous calculations, rules for the performance of which are contained in the Súryaprajñapti itself as well as in a great number of old karaṇa-gáthás quoted by the commentator; remarking at once that the rules contained in the gáthás presuppose exactly the same system as the rules of the Súryaprajñapti itself. A comparison of these calculations with those contained in the jyotisha-vedáṅga shows the extreme likeness and in many cases the complete identity of the two sets; a result which supplies another reason for looking on the Súryaprájñapti as—in all essential points—a fair representative of Indian astronomy anterior to the period of the Siddhántas. Several of these calculations have already been reproduced above incidentally; in the following a detailed account of the more important ones among those not yet touched upon will be given.

It appears that before the influence of Greek astronomy made itself felt in India, the division of the sphere into 27 or 28 nakshatras was the only one employed and that no independent subdivisions of the nakshatras were made use of. This want was, however, supplied by a simple transfer of the subdivisions of time to the nakshatras. In accordance with this principle the Súryaprajñapti divides the sphere into $819 \frac{27}{67}$ muhúrtas, this being the duration of the periodical revolution of the moon, and allots to each nakshatra a certain number of muhúrtas according to its greater or smaller extent. Fixed subdivisions of the muhúrta such as are commonly met in Indian astronomical works are, however, nowhere employed by the author of the Súryaprajñapti; he apparently preferred to keep himself perfectly free from restrictions of this kind and uses throughout those fractions of the muhúrta only which were immediately suggested by the various calculations in hand. From the general nature of the yuga it is manifest at once which fractions will present themselves most readily; they are sixty-seconds and sixty-sevenths (62 = number of synodical months in a yuga, 67 = number of periodical months) and, whenever lunar months of both kinds enter into the calculations, sixty-sevenths of sixty-seconds.

One of the most important rules is that which teaches how to find the place of the moon on any parvan. In the following the details of the calculation furnished by the commentator will be stated in extenso, so that at least one complete specimen of computations of this kind may be exhibited.—If we wish to devise a rule for calculating the place of the moon in the circle of the nakshatras at any parvan, we must at first find the constant quantity—the dhruvaráśi—entering as a multiplicand into all calculations of this kind. This in our case is clearly the space passed through by the moon during the lunar month, or more simply, because entire revolutions which bring the moon back to the same place can be neglected, the excess of the lunar synodical month above the periodical month. From what is known about the general constitution of the yuga this quantity is of course readily found to be equal to $66 + \frac{5}{62} + \frac{1}{62 \times 67}$. The commentator calculates this quantity as follows. If the sun performs during 124 parvans five complete revolutions, how much does he perform during 2 parvans (= one synodical month); answer: $\frac{5 \times 2}{124} = \frac{5}{62}$ rev. This therefore is the excess of the synodical month above the periodical one. In order that the division can be carried out, the $\frac{5}{62}$ rev. are turned into nakshatras by multiplying them by $\frac{1830}{67}$ (*i. e.* by $27 \frac{21}{67}$, the duration in ahorátras of the periodical month or, if we like, the extent of the nakshatras; 27 entire nakshatras plus the fractional nakshatra Abhijit). Result of the multiplication $\frac{9150}{4154}$. Again—in order to turn the days or nakshatras into muhúrtas—the numerator is multiplied by 30. Result $= \frac{274500}{4154}$. This division being performed gives as result 66 muhúrtas. The remainder 336 is multiplied by 62 and the product again divided by 4154. Result $= \frac{5}{62}$ muhúrtas. The remainder—62—should again be multiplied by 67 (the fractions employed being throughout sixty-seconds and sixty-sevenths) and divided by 4154; but 4154 being itself $= 62 \times 67$, it is seen at once that the result is 1. Thus the whole quantity is $66 + \frac{5}{62} + \frac{1}{62 \times 67}$ muhúrtas. If now the place of the moon at any amávasyá or púrṇamási is wanted, the above quantity has to be multiplied by the number of the parvan; for instance, by one if the moon's place at the first full moon after the beginning of the yuga is wanted. The product shows how far the moon at the time has advanced beyond the place she had occupied at the beginning of the yuga, if full moons are concerned, or beyond the place she had occupied at the new moon preceding the beginning of the yuga, if new moons are concerned, (the new moon immediately antecedent to the beginning of the yuga having been selected as starting-point for all calculations concerning new moons). So far the place of the moon is expressed in muhúrtas only; now in order to find from these the nakshatra in which the moon stands at the time, we should have to deduct from the muhúrtas found the extent of all the nakshatras through which the moon has passed one after the other, until the sum would be exhausted. Thus, for instance, if we wanted to find the place of the moon at the third new moon after the beginning of the yuga, the constant quantity $66 + \frac{5}{62} + \frac{1}{62 \times 67}$ would have to be multiplied by 3, so that we should have $198 + \frac{15}{62} + \frac{3}{62 \times 67}$ muhúrtas. Now the moon standing at the new moon preceding the beginning of the yuga in Punarvasu, of which she has still to pass through $22 \frac{46}{62}$ muhúrtas, we should have to deduct this last quantity from $122 + \frac{10}{62} + \frac{2}{62 \times 67}$; from the remainder we should have to deduct 30 muhúrtas (the extent of Pushya); from the remainder again 15 (A'sleshá); again from the remainder 30 (Maghá), and so on, until in the end the fact of the remainder being smaller than the next following nakshatra would show that new moon takes place in that nakshatra.—In order, however, to shorten this somewhat lengthy process, certain subtrahends are formed out of the sum of the extent of several nakshatas, which materially alleviate the work by substituting one subtraction for a number of subtractions. Thus with reference to new moon—the subtrahend (śodhanaka) for Uttara-phálguní is said to be 172, for Viśákhá 292, for Uttara-áshádhá 442; *i. e.*, if from the product of the constant quantity by the number of the new moon 172 can be deducted, we see at once that the moon has advanced beyond Uttara-asháḍháḥ; if 292 can be deducted, she has passed the limits of Viśákhá and so on. The subtrahends are not carried on from Punar-vasu beyond Uttara-ásháḍhá, but make a fresh start from Abhijit, apparently in order to make them available for the calculation of the places of the full moons too. Thus the subtrahend for Abhijit is 9 and a fraction, of Uttara-bhádrapadá 159, of Rohiṇi 309, of Punarvasu 399, of Uttara-phálguní 549, of Viśákhá 669, of Múla 744, of Uttara-asháḍhá 819.

The places in which the different full moons of the yuga occur are found by an exactly similar proceeding; only all calculations have to start not from Punarvasu, but from the beginning of Abhijit where the first full moon which coincides with the beginning of the yuga takes place. The text enumerates the places of all full moons and new moons of the yuga at length, carrying in each case the calculations down to sixty-sevenths of sixty-seconds of muhúrtas. It is needless to reproduce these lists here in extenso, as any place wanted can be calculated with ease from the general rule given above.

The same result, *viz.*, to find the place of the moon on a given parvan is obtained by following another rule contained in some gáthás quoted by the commentator. Their purport is as follows. Multiply sixty-seven (the number of periodical revolutions which the moon makes during one yuga) by the number of the parvan the place of which you wish to find and divide this product by one hundred and twenty-four (the number of parvans of one yuga). The quotient shows the number of whole revolutions the moon has accomplished at the time of the parvan. The remainder is to be multiplied by 1830 (*viz.*, 1830 sixty-sevenths which is the number of nycthemera of one periodical month) or more simply by 915 (reducing 1830 as well as the denominator *viz.*, 124 by two). From the product (remainder multiplied by 915) deduct 1302, which is that part of a whole revolution which is occupied by Abhijit (Abhijit occupies $\frac{21}{67}$ days, but as this amount is to be deducted from the numerator of a fraction the denominator of which is 62, 21 is to be multiplied by 62; product = 1302). The portion of Abhijit, from which the moon's revolutions begin, is deducted at the outset, because it is greatly smaller than the portion of all other nakshatras and would disturb all average calculations. After it is has been deducted the remainder is divided by 67 × 62; the quotient shows the number of nakshatras beginning from S'ravaṇa which the moon has passed through, in addition to the complete revolutions. The remainder is again multiplied by thirty, the product divided by 62; the quotient shows the number of muhúrtas during which the moon has been in the nakshatra in which she is at the time. And so on down to small fractions of nakshatras. The following is an example. Wanted the place of the moon at the end of the second parvan. Multiply 67 by 2; divide the product by 124. The quotient (1) indicates that the moon has performed one complete periodical revolution. The remainder (10) is multiplied by 1830 or more simply by 915 (see above); from the product (9150) the portion of Abhijit (1302) is deducted. The remainder (7848) is divided by 67 × 62 = 4154; the quotient (1) shows that after Abhijit the moon has passed through one complete nakshatra, *viz.*, S'ravaṇa. The remainder (3694) is multiplied by 30; the product (110820) again divided by 4154; the quotient (26) shows that the moon has moreover passed through 26 muhúrtas of S'ravishṭhá. By carrying on this calculation we arrive at the result that at the end of the second parvan the moon stands in S'ravishṭhá, of which she has passed through $26 + \frac{42}{62} + \frac{2}{62 \times 67}$ muhúrtas.

Analogous calculations are made for the sun too. For instance, in what circle does the sun move at the time of each parvan? The rule here is very simple. Multiply the number of the parvan by fifteen (the number of tithis of one parvan) and from the product deduct the number of avamarátras (excessive lunar days) which occur during the period in question. If the parvan occurs during the first ayana of the sun, the remainder immediately indicates the number of the solar circle which is in fact the same as the number of the civil day on which the parvan happens; if the parvan takes place during one of the other nine ayanas, the remainder must at first be divided by 183 (number of circles described by the sun during one ayana); etc. The rule is simple and needs no illustration.

The rule for finding the nakshatra in which the sun stands at the time of each parvan (the súryanakshatra) is quite analogous to the rule given above for the moon. The sun makes in one yuga five complete revolutions, in one parvan $\frac{5}{124}$ revolutions. This quantity is to be multiplied by the number of the parvan and then we have as above to descend by continued multiplication and division to nakshatras, sixty-second parts of nakshatras and sixty-seventh parts of sixty-second parts. Instead of deducting the portion belonging to Abhijit at the beginning of which the moon stands on the first day of the yuga, we have to deduct that part of Pushya which the sun has not yet passed through at the beginning of the yuga; it amounts to $\frac{44}{67}$ of a nychthemeron. All the remainder of the calculation is the same as in the moon's case and illustrative examples are therefore not wanted.

Besides there is another and considerably simpler method for finding the sun's place at the end of a parvan; it is likewise contained in some old karaṇa-gáthás. The rule again assumes a "dhruvaráśi", a constant quantity, to be used in all calculations of this kind. This quantity is $33 + \frac{2}{62} + \frac{34}{62 \times 67}$ muhúrtas; for if we divide the whole circle of the nakshatras into $819 \frac{27}{67}$ muhúrtas (which is the time occupied by a complete revolution of the moon) the above amount expresses the way the sun accomplishes during one parvan. This quantity has therefore to be multiplied by the number of the parvan required, and by subtracting from the product at first the $19 + \frac{43}{62} + \frac{33}{67 \times 62}$ muhúrtas belonging to Pushya, after that the 15 muhúrtas of Áśleshá, after that the 30 muhúrtas of Maghá etc., we find in the end the nakshatra in which the sun completes the parvan. In order to facilitate these somewhat lengthy subtractions, the muhúrtas of a certain number of nakshatras are again added and presented in a tabular form. So for instance 139 muhúrtas (19 + 15 + 30 + 30 + 45) lead us up to the end of Uttara-phálguní, and if therefore the product found in the manner shown above exceeds 139, we may at once subtract 139 instead of performing five separate subtractions and know that the sun has at the time passed beyond Uttara-phálguní. The procedure is analogous to the one described above and needs no further illustration.

For finding how many seasons have elapsed on a certain tithi, the commentator quotes some gáthás of the old teachers. The rule they contain is as follows Multiply the number of the parvans which have elapsed since the beginning of the yuga by fifteen, and add to the result the number of tithis which have elapsed in addition to the complete parvans; deduct from this sum its sixty-second part; multiply the remainder by two and add to the product sixty-one; divide the result by one hundred and twenty-two; the quotient shows the number of seasons elapsed (which when exceeding six will have to be divided by six, since so many seasons constitute a solar year); the remainder divided by two shows the number of the current day of the current season. This rule seems not very well expressed, although it may be interpreted into a consistent sense. At first it must be remembered that the yuga does not begin with the beginning of a season, but with the month śrávaṇa, while the current season—the rainy season—has begun a month earlier with áshádha. The calculation would hen, strictly expressed, be as follows. Take the number of parvans which have elapsed since the beginning of the yuga, add to it the tithis which have elapsed of the current parvan and add again to this sum 30½ tithis (the tithis of áshádha plus half a tithi of the month preceding áshádha) and deduct from this sum its sixty-second part, *viz.*, the so-called avamarátras, *i. e.*, the lunar days in excess of the natural days (according to the Súryaprajñapti's system each sixty-second tithi is an avamarátra). The remainder of the calculation needs no explanation; the formula enjoins the addition of 61 instead of 30½ and division by 122 instead of 61 (the number of days of a season) in order to get rid of the fractional part of 30½.

In order to find the number of the parvan during which an avamarátra occurs and at the same time the tithi itself which becomes avamarátra, the following rule is given. The question is assumed to be proposed in the following manner. In what parvan does the second tithi terminate while the first tithi has become avamarátra, or in what parvan does the third tithi terminate while the second is avamarátra? and so on, (kasmin parvaṇi pratipady avamarátríbhútáyám dvitíyá samáptim upayáti, etc.) The answer is: if the number of the tithi which becomes avamarátra is an odd one, one has to be added to it and the sum to be multiplied by two; the result shows the number of parvans elapsed before the first tithi becomes avamarátra. If the number is an even one, one is added to it, the sum multiplied by two, and to the product thirty-one is added; the result again shows the number of parvans elapsed. Thus for instance if it is asked: when does the first tithi become avamarátra? add one to one (number of the tithi) result two; this multiplied by two gives four; therefore pratipad is avamarátra in the fifth parvan, after four parvans have elapsed. Or again it may be asked: when does the second tithi become avamarátra? add one to two; result three; this multiplied by two gives six, to which thirty-one are added. The result—thirty-seven—shows that in the thirty-eighth parvan the second tithi is avama-rátra. Thus all the avama-rátras for the first half of the yuga are found and the same numbers recur during the second half. The rationale of this rule is obvious.

A simple rule is given for finding the tithis on which the ávṛittis of the sun, *i. e.*, the solstices take place. Multiply the number of the solstice whose date you wish to know by **183** and add to the result three plus the number of the solstice; divide this sum by fifteen; the quotient shows the number of parvans elapsed, the remainder the number of the tithi of the current parvan. This rule—being based on the relation of tithis to sávana days needs no explanation. The following list for the whole yuga results from these calculations.

1st Summer solstice (= 10th solstice of the preceding yuga).	1st dark half of śrávaṇa.
1st Winter solstice,..................................	7th „ „ „ mágha.
2nd S. S., ...	13th „ „ „ śrávaṇa.
2nd W. S., ...	4th light half of mágha.
3rd S. S., ...	10th „ „ „ śrávaṇa
3rd W. S., ...	1st dark half of mágha.
4th S. S., ...	7th „ „ „ śrávaṇa.
4th W. S., ...	13th „ „ „ mágha.
5th S. S., ...	4th light half of śrávaṇa.
5th W. S., ...	10th „ „ „ mágha.

The places which the sun occupies in the circle of the nakshatras at the time of the solstices have been mentioned before; the places of the moon at the same periods can of course be easily calculated when it is remembered that at the beginning of the yuga the moon just enters Abhijit. It is unnecessary to reproduce here the rule given for that purpose; it may only be mentioned that the $\frac{7}{10}$ of a sidereal revolution which the moon performs during one solar ayana in excess of six complete revolutions constitute the "dhruva ráśi" for our case. The Súryaprajñapti likewise states the places in which the lunar ávṛittis take place; from the circumstance that at the beginning of a yuga the moon is full in the first point of Abhijit and at the same time commences her progress towards the north, it follows that her next progress towards the south takes place exactly on the same spot on which the sun was standing at the beginning of the yuga. At all following lunar ávṛittis the places of the two first ones of course recur.

Incidentally another rule is mentioned which certainly was of frequent application, *viz.*, how to find on what natural day and at what moment of time during that day a given tithi terminates. The rule which is contained in an old karaṇa-gáthá is of course very simple. Add together all tithis which have elapsed from the beginning of the yuga up to and including the tithi in question; divide this sum by sixty-two; multiply the remainder by sixty-one and divide again by sixty-two. The remainder is then the wanted quantity. The first division by sixty-two has the purpose to shew by its quotient—the number of complete avamarátras elapsed since the beginning of the yuga; this number has therefore to be deducted from the number of tithis elapsed. The remainder of the above division shows the number of tithis which have elapsed since the occurrence of the last avamarátra; to find by how much they remain behind the same number of natural days, they are multiplied by 61 and divided by 62 (61 natural days = 62 tithis); the remainder then indicates how many sixty-second parts of the current natural day have elapsed at the moment when the tithi in question terminates.

Another old rule has the purpose of teaching how to find the number of muhúrtas which have elapsed on the parvan-day at the moment when the new parvan begins. When the number of the parvan divided by four yields one as remainder (in which case it is called kaly-oja) we must add ninety-three to it; if divided by four it yields two (in which case it is called dvápara-yugma), we add sixty-two to it; if it yields three (tretá-oja), we add thirty-two; if there is no remainder (kṛita-yugma), we add nothing. The sum which we obtain in each case is halved, then multiplied by thirty, finally divided by sixty-two. The quotient shows the number of muhúrtas of the parvan-day which have elapsed at the moment when the new parvan begins. The rationale of this rather ingenious rule is as follows. The duration of one parvan is $14\frac{94}{124}$ days. The first parvan therefore terminates when $\frac{94}{124}$ of the day $= \frac{94 \times 30}{124} = \frac{47 \times 30}{62}$ muhúrtas have elapsed. The number 94 may be obtained by adding 93 to 1, the number of the first parvan. The second parvan ends $29\frac{64}{124}$ days after the beginning of the yuga; 64 equals $62 + 2$, the number of the second parvan. The third parvan terminates $44\frac{34}{124}$ days after the beginning of the yuga; 34

equals 61 + 3, the number of the third parvan. The fourth parvan terminates 59 $\frac{4}{124}$ days after the beginning of the yuga; 4 without any addition is the number of the parvan. The fifth parvan again terminates 73 $\frac{98}{124}$ days after the beginning of the yuga; 98 is equal to 93 + 5, the number of the parvan. And so on through the whole yuga.

The above examples fairly represent the more important rules contained in the Súryaprajñapti. Now it will be apparent to every one who is to some extent familiar with the Jyotisha-vedánga* that the rules contained in the, as yet partly unexplained, verses of the latter refer to calculations exactly analogous to those contained in the Súryaprajñapti and the old gáthás quoted by the commentator.

From this it might be concluded that it is now easy for us to explain whatever has up to the present remained unexplained in the Vedáñga, possessing as we doubtless do a clear insight into the general nature of the calculations for which it furnishes rules. But close as the connexion between the contents of the two treatises manifestly is, there are two reasons which preclude the direct application of the rules of the Súryaprajñapti to the elucidation of the Vedáñga. In the first place the Vedáñga divides the sphere into twenty-seven nakshatras only and, as far as has been ascertained up to the present, these twenty-seven nakshatras are considered to be of equal extent; while as we have seen above the Súryaprajñapti throughout employs the division of the sphere into twenty-eight nakshatras of unequal extent. In the second place the starting point for all calculations (*viz.*, the places of the winter and summer solstice) is not the same in the two works. The consequence of these two fundamental discrepancies is that although the questions treated of are essentially the same and although the modes of calculation are strictly analogous the results arrived at in the two treatises necessarily differ in all cases, that for instance the place of a certain full or new moon during the quinquennial yuga can never be the same according to the Súryaprajñapti as it is according to the Vedáñga, etc. Nevertheless it is highly probable that somebody who should apply himself to the study of the obscure portions of the Vedáñga after having made himself thoroughly conversant with the contents and methods of the Súryaprajñapti, would succeed in solving some more of the riddles presented to us by the former work.

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* Since the publication of the paper on the Jyotisha-vedáñga in the 46th volume of this Journal, the writer has received some very important contributions to the explanation of the Vedánga from Dr. H. Oldenberg, the well-known editor of the Vinayapiṭakam, who working altogether independently had succeeded in explaining a number of hitherto obscure rules. The writer intends to revert to the Vedánga before long and will then avail himself of the new results most kindly placed at his disposal by Dr. Oldenberg.

It must be remembered that there is no indissoluble connexion between that part of the system of the Súryaprajñapti, which might be called the chronometrical one, *viz.*, the doctrine of the quinquennial yuga and its various subdivisions and that part which propounds the theories accounting for the apparent motions of the sun and the moon; it might therefore be that the Vedáñga agrees with the Súryaprajñapti only in the former point and follows a different course with regard to the latter. There occurs, however, one expression in the Vedáñga which makes it appear likely that the analogy between the two books extends to the second point also, *viz.*, the "súryamaṇḍaláni" mentioned in verse 22.

अतीतपर्वभागेभ्यः शोधयेद् द्विगुणां तिथिम्।
तेषु मण्डलभागेषु तिथिनिष्ठां गतो रविः॥

It certainly looks as if by these "sun circles" in which the sun is said to be at the end of a tithi, we had to understand daily circles of the same kind as those which, according to the Súryaprajñapti, the sun describes round Mount Meru.

A few words may here be added on the principal feature common to the cosmological systems of the Puráṇas, Buddhists and Jainas, *viz.*, the doctrine of sun, moon and constellations revolving round Mount Meru. In order rightly to judge of these conceptions we must remember that they arose at a time when the idea of the sphericity of the earth had not yet presented itself to the Indian mind, at a time (—if we may assume that the Puráṇic-Buddhistic cosmological system is not later than the period of the rising of Buddhism—) when this then truly revolutionary idea first suggested itself to the early Greek philosophers. And if we carry our thoughts back to that early stage of the development of scientific ideas and try to realize the conceptions which then were most likely to present themselves to enquirers, the old Indian system will lose much of its apparent strangeness and arbitrariness. How indeed could men ignorant of the fact that the earth is a sphere freely suspended in space explain to themselves the continually recurring rising and setting of the heavenly bodies? what could their ideas be regarding the place to which sun and moon went after their setting, and the path which unseen by man they followed so as to return to the point of their rising? Certainly the difficulty was a very great one to those as well who had some vague notion about the earth extending in all directions to an unlimited distance as to those who imagined it to be bounded at a certain distance by a solid firmament surrounding and shutting it in on all sides. We may recall, as one of the fancies to which the difficulty of this question gave rise, the old poetical idea, preserved, for instance, in a beautiful fragment of Stesichorus, of Helios when he has reached Okeanos in the west embarking in a golden cup which carries him during the night round half the earth back to the east whence he rises again. Under these circumstances we must admit that the old Indian idea of the constitution of the world, according to which the rising and setting of sun, moon and stars is only apparent, cannot by any means be called an unnatural one, and it is interesting to consider the counterparts it finds among what is known of the opinions of the oldest Greek philosophers.* So it is reported of Anaximenes that he supposed the sun not to descend below the earth, but to describe circles above it and to pass during the night behind high mountains situated in the north; an exact parallel to the Indian conception. Of Xenophanes we hear that he declared the sun, moon and stars to be only accumulations of burning vapour, fiery clouds kindling and extinguishing themselves by turns, that these clouds move in reality in straight lines and only appear to us to rise and to set in consequence of their varying distance, in the same way as the common clouds seem to rise from the horizon when they first become visible to us and seem to sink under the horizon when they pass out of our field of vision. These opinions too find their exact counterpart in the Súryaprajñapti and kindred works where the rising and setting of the heavenly bodies is declared to be an appearance caused by their consecutive approaching and receding, and where their movement is said to take place not indeed in a straight line but at any rate in a plane parallel to the plane of the earth. The first mentioned opinion of Xenophanes about the constitution of the heavenly bodies finds its analogon in one of the different pratipattis, mentioned in the Súryaprajñapti, according to which the sun is nothing but a "kiraṇasaṃghàta," an accumulation of rays forming itself every morning in the east and dissolving itself in the evening in the west. The cognate views held by Heraclitus concerning the nature of the sun are well known. Of Xenophanes it is further reported that he supposed different climes and zones of the earth, far distant from each other, to have different suns and moons; which is another striking parallel to the view held by the Jainas with reference to the different suns, moons and stars illuminating the different concentric dvípas of which the earth consists. In both cases the assumption of the rising and setting of the heavenly bodies being an appearance, caused by their becoming visible and invisible in turns when having approached us or receded from us by a certain amount, seems to have lead to the conclusion that the light of the one sun and the one moon appearing to us cannot illumine the whole vast earth, since it only reaches to a certain limited distance.—On the other hand it is true enough that, notwithstanding these similarities of Indian and Greek ideas, books of the nature of the Súryaprajñapti serve clearly to show the difference of the mental tendencies of the two nations. Both in an early age conceived plausible theories, in reality devoid of foundation, by which they tried to account for puzzling phenomena; but while the Greeks controlled their theories by means of continued observation of the phenomena themselves and replaced them by new ones, as soon as they perceived that the two were not in harmony, the Hindus religiously preserved the generalisations hastily formed at an early period, and instead of attempting to rectify them, proceeded to deduce from them all kinds of imaginary consequences. The absurdity of systems of the nature of the Jaina system lies not in the leading conceptions—these can as a rule be accounted for in a more or less satisfactory manner—but in the minute detail into which the followers of the system have without scruple and hesitation worked it out.

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* For the particulars mentioned in the following: comp. Mullach's collection of the fragments of the Greek philosophers, Zeller's history of Greek philosophy, Lewis's historical survey of the Astronomy of the Ancients.

Before this paper is brought to a conclusion, the writer wishes to draw attention to the—in his opinion very striking—resemblance which the cosmological and astronomical conceptions, contained in an old Chinese book, bear to the early Indian ideas on the same subject, more particularly to the Jaina system as expounded in the Súryaprajñapti. The Chinese book alluded to is the Tcheou-Pei of which a complete translation was published for the first time by Edward Biot in the Journal Asiatique for 1841, pp. 592—639. It consists of two parts of different ages; the first part which apparently is of considerable antiquity, has been known since the time of Gaubil, who inserted a translation of it into his history of Chinese astronomy, published in the Lettres éd fiantes; that part, as is well known, shows that the ancient Chinese were acquainted with the theorem about the square of the hypothenuse of a right-angled triangle. The second and more recent part, which E. Biot thinks cannot be later than the end of the second century of our era, contains a sort of cosmological and astronomical system, and here the traits of resemblance alluded to above are to be found. As the arrangement of topics in the Tcheou-Pei is by no means systematic, so that it is not easy to form a clear conception of the essential points, a short abstract of the work, as far as it lends itself to a comparison with the Jaina system, is given in the following.

According to the Tcheou-Pei the sun describes during the course of the year a number of concentric circles of varying diameter round the pole of the sky. On the day of the summer solstice the diameter of this circle is smallest; it then increases during the following months, up to the day of the winter solstice when it reaches its maximum. Beginning from this day the solar circles again decrease, until on the day of the next summer solstice they have reached the original minimum. On the day of the winter solstice the diameter of the solar circle amounts to 476,000 li (the li is a certain Chinese measure of length); its circumference to 3 × 476,000= 1,428,000 li. The corresponding numbers for the circle, described on the day of the summer solstice, are 238,000 and 714,000. Between the innermost and the outermost circle there lie five other circles, which the sun describes in the months intervening between the two solstices, so that there are altogether seven circles; the six intervals between these are said to correspond to the months of the year (2 × 6 = 12). So it appears that the Tcheou-Pei assumes separate solar circles for each month only, not for each day. Each circle is at the distance of 19,833⅓ li from the two neighbouring circles.

The terrestrial place for which all the calculations of the Tcheou-pei are made is said to have such a situation that it is distant 16,000 li from the spot lying perpendicularly under the sun on the day of the summer solstice and 135,000 li from the spot lying perpendicularly under the sun on the day of the winter solstice; the distance of the place of observation from the pole, *i. e.*, the spot at the centre of the earth which lies perpendicularly under the celestial pole, is said to amount to 103,000 li. Round the terrestrial pole there extends a circle of 11,500 li radius, which is the terrestrial counterpart of the circle described by the polar star round the celestial pole. The light of the sun extends 167,000 li in each direction, so that on the day of the winter solstice when the sun moves in the exterior circle it extends at midday only 32,000 li beyond the place of observation and so does not reach up to the polar circle. On the days of the two equinoxes when the sun is moving in the fourth circle—the diameter of which amounts to 357,000 li—the rays of the sun just reach up to the polar circle. On the day of the summer solstice when the sun moves in the interior circle his rays reach beyond the pole to the extent of 48,000 li, so that then the whole polar circle is continually illuminated. When the sun in his daily revolution has reached the extreme north point, it is midday in the northern region and midnight in the southern region; when he has reached the east point, it is midday in the eastern, midnight in the western region; when he has reached the south point, it is midday in the southern, midnight in the northern region; when he has reached the west point, it is midday in the western, midnight in the eastern region. As the light of the sun always reaches 167,000 li each way, we must add 2 × 167,000 to the diameter of the circle, described on the day of the winter solstice, in order to obtain the diameter of the circle representing the outmost limit reached by the rays of the sun; the diameter of this circle is therefore 810,000 li.

On the day of the winter solstice the space illuminated by the sun stands to the space not reached by his rays in the relation of three to nine; this proportion is to be reversed for the day of the summer solstice. The day of the winter solstice is the shortest during the year; the day of the summer solstice the longest. On the day of the winter solstice the shadow of the gnomon is 13·5 feet long; beginning from this day it goes on diminishing by equal quantities during equal spaces of time up to the day of the summer solstice when its length is reduced to 1·6 feet. It then increases again in the same uniform manner up to the day of the next winter solstice.

The circumference of the sky is divided into twenty-eight stellar divisions of unequal extent, through the circle of which sun and moon are performing their revolutions. Kien-nieou is the asterism in which the sun stands at the winter solstice; Leou the asterism of the vernal equinox etc. A procedure is taught how to find the place of the sun at any time. The whole circle of the asterisms is divided into 365¼ degrees corresponding to the number of the days of the year. A year is the period which the sun requires for returning to the same star from which he had set out. The meeting of sun and moon constitutes a month. A period of nineteen years of 365¼ days each contains 235 lunations. Arithmetical rules are given how to find the place of the moon at the beginning of each year etc.

The Tcheou-pei contains some additional matter about observations of the polar star etc., but by far the greater part of the topics it treats have been touched in the above summary. The similarity of this system and the old Indian systems particularly, as far as some details are concerned, the Jaina system is obvious. The same supposition is made use of in both to account for the alternating progress of the sun towards the north and the south. In the Jaina system the sun revolves round Mount Meru, in the Chinese system, to which the idea of a central mountain seems to be foreign, round the pole of the sky; Mount Meru finds, however, a curious counterpart in the Chinese polar circle, the projection of the circle described by the polar star. Both systems state the dimensions of the circles described by the sun; both state in figures the extent to which the rays of the sun reach. Both hold the same opinion about the alternation of day and night in the different parts of the earth. Both are interested in finding out what places sun and moon occupy in the circle of the nakshatras. Both teach the increase of the shadow by an equal quantity in each month. On the other hand there are important points in which the two systems differ. The Chinese appear from comparatively ancient times to have had a knowledge of the fact that the approximate duration of the solar year amounts to 365¼ years and that a period of nineteen years comprises 325 lunations. This of course makes the system of the Tcheou-pei to differ from the Jaina system in all those details which depend on the fundamental period and the advantage is of course altogether on the side of the Chinese. On the whole the Tcheou-pei is much superior to works of the stamp of the Súryaprajñapti, as in midst of all the fantastical and unfounded ideas it contains there are found some positive elements, observations of stars which admit of control etc., features altogether absent in the Súryaprajñapti. But in spite of these points of difference the similarities of the two works remain striking, especially if we take as one member of the comparison not the Súryaprajñapti itself but some hypothetical older work of the same class, less elevate and more moolerate in the statement of dimensions, figures etc. That such works if not existent at present must have existed at same earlier period is manifest from the remarks the Súryaprajñapti in many places makes about the opinions of other teachers, several of which have been extracted above. That two different chronological periods, the quinquennial yuga and so called Metanic cycle, from the foundation of the two systems does after all not interfere very much with their similarity. We might imagine the Jainas adopting the more correct cycle of nineteen years instead of the quinquennial one and work out all the new details necessitated by such a change, calculate all the places of moon and full moon during nineteen years instead of five etc., nevertheless the new system would immediately suggest the idea of the old one. An essential feature in the resemblance of the Chinese and the Hindu system is more over the circumstance of both limiting themselves to the treatment of a certain number of topics. The following paragraph of the Tcheou-pei (p. 603) which shortly states the questions to be treated in the work, might with hardly any change be taken as a summary of the contents of the Súryaprajñapti.

"I have heard people speak of the knowledge of the great man. I have heard it said that he knows the height and the size of the sun, the extent which his light illuminates, the quantity by which he moves in the course of one day, the quantity be which he recedes and approaches, the extent which the eye of man embraces, the position of the four extreme (cardinal) points, the divisions of the stars arranged in order, the breadth and length of the sky and the earth."

The question whether the similarity of the two systems justifies us in assuming a historical connexion between the two or would be an interesting one, but cannot be treated in this place, especially as its solution could only be attempted together with the solution of a number of cognate problems.

Coins supplementary to Thomas' "Chronicles of the Pathán kings of Delhi."—*By* Chas. J. Rodgers. (With a Plate.)

Steady research is always followed by constant results. These results are as a rule insignificant discoveries which are individually small, but collectively they all go to swell the sum of human knowledge. In my last small supplement to Thomas' "Chronicles of the Paṭhán kings of Delhi" I promised to give some additions which I had then in hand. But as I went on with two other papers and my researches for them, I found that incidentally my matter for the second supplement grew more interesting, and at last I found to my surprise that I had more coins in hand than would fill two plates; so I began to draw at once and simultaneously to put away for a third supplement all coins for which I could not now find a place. Strange to say just as I had made up my mind about these plates a find of about 500 coins of five Ghazni kings, all struck at Lahore, came to hand, some quite new and unpublished, and after that a batch of silver coins of Ala-uddin Khwárizmí of whose coins I gave three new types in my first supplement and of whose I give one great beauty in my present paper. These silver coins were struck at *Ghazní* and *Farwán* or as Thomas calls it '*Perwán*.' He gives no drawings of them and only alludes to them as giving us the mint of Perwán. These Ghazní kings' and the Khwárizmí king's coins must stand over for the present. I scarcely dare make a promise about them. About a year ago I came across a find of Ghazní coins, in number about 500, and up till now I have had no time to work at them and say what was in them, although there were several novelties of historic value. As I personally go to the bazars I see for myself what comes into them. And when I see what comes into them and what finds a lodgement in our museums, I am astonished and dumb-foundered to think that coins of whose existence we are unaware are daily being brought in from the villages and fields and ruins which abound here and there in the country and are simply handed over to the smelting pot as common silver,—bullion in fact which is purchased at a little less than its intrinsic value. And all this, while there is in India no Imperial Cabinet of Coins and no one appointed to collect for it and arrange it and make it a thing worthy of the historical associations, India as an Empire and as a collection of ancient kingdoms and states, possesses. India is a continent: but it is too poor to possess one Imperial Cabinet of coins which would serve as a metallic record of past emperors and rulers, past glories and shames, in fact, which would be a history of the past in metal manuscripts. With the present rage for melting down everything it is high time something were attempted. Our only relics will soon be empty, worn out, burnt up smelting pots.

In the present supplement the coins I give are chiefly varieties of coins already known. The inscriptions are sometimes longer than those given in Thomas: sometimes they correct his readings; sometimes the coins reveal new mints, sometimes they are quite new types of coins.

Plate I, No. 1. Obv. *Táj ud daulat Khusrau Malik.*
Rev. Bull with new mark on its *jhúl.*

This coin is quite a new type of Khusrau Malik's coins.

No. 2. Obv. *(As sultán ul) Ạzim Táj ud Daulat Khusrau Malik.*
Rev. Bull with new mark on its *jhúl.*

No. 3. Obv. *(Us sultán al) Ạzim Rukn ud dunyá wa ud Dín Fíroz (Sháh).*
Rev. Remains of a horseman and his steed.

Thomas gives three coins belonging to this king (Pl. I, fig. 24, 25, 26). I ascribe these three to Rezia. The *Rukn* is unmistakeable in my coin. I give in No. 4 a drawing of a coin I have, which is exactly like one of Thomas' (No. 24). A careful study of it will at once show that it reads Obv. "*Us sultán al Muazzim Rezia ud Dunyá wa ud Dín.*" Rev. Horseman and steed, exactly like Thomas'. In my coin the *zwád* (ض) is more fully developed and it must be a coin of Rezia's.

In Pandit Ratan Narain's list of coins I find a rupee of *Rukn ud Dín Fíroz Sháh's.* Obv. *As sultán ul 'Ạzim Shams ud Dunyá wa 'd Dín, abú 'l Muzaffar Rukn ud Dunyá wa 'd Dín Fíroz Sháh.* Rev. *Fí ahd il Imám Al Mustansir, Amír ul Momínín, fí shahúr i san thaláth wa thaláthín wa sita mi'ata.* In this rupee the letters of *Rukn* are exactly as in my coin. It has no margins, the date is given in the square area. This rupee is quite unique. I should very much like to know its whereabouts. Such a coin should by no means leave the country. I may add that Ratan Narain gives in his list a copper coin like mine, and, being misled by Thomas, gives also two of Rezia's coins as Rukn ud Dín's. I have four coins of Rezia's of this kind, as well as four of the type I published in my last paper, and one each of Thomas' Pl. I, figs. 28 and 29. On comparing them I have no hesitation whatever in assigning Thomas' Pl. I, Nos. 24, 25, 26 to Rezia.

In my last paper I gave a coin of Sanjar and Bahrám Sháh. In it the title of *Muazzim* was given to Sanjar. In my present paper I give coins which shew that this title was given to several kings, who rejoiced however, as is shown by their numerous coins, in the title *al Ạzim.*

No. 5. Obv. "*As sultán ul Muazzim, Alá ud Dunyá wa 'd Dín.*" Rev. Horseman and steed.

No 9. Obv. *As sultán ul Muazzim Eltatamsh as Sultán.* Rev. Horseman and steed and remains in Hindi of *Srí Hamírah.*

Plate II, No. 2. Rev. *Us sultán ul Muazzim.*
Obv. *Gyás ud Dunyá wa ud Dín.*

In these three coins Alá ud Dín (Masaud Sháh) and Shams ud Dín Altamsh and Gyás ud Dín (Balban) we have the title *Muazzim.* And it comes also in No. 6 which I now proceed to describe.

No. 6. Obv. in florid Kufic "*As sultán ul Muazzim Shams ud dunyá wa 'd dín Abú 'l Muzaffar (Eltamash ?).* Rev., in a rayed circle, the Kalimah, under which *(Al Mustansir) biamri 'llah Amír ul Mominín.* This coin weighs 62 grs. only. It is therefore a tankah. It came to hand with three *Bahá ud Dín Sám's* silver tankahs.

No. 7. A rupee of Shams ud Dín Altamsh.

Obv. "*As Sultán ul Azim Shams ud Dunyá wa 'd Dín Altamsh as Sultán Násir i Amír ul Mominín.*" Rev. *Fí ahd il Imám Al Mustansir Amír ul Momanín. Margin* illegible alas!

No. 8. Obv. in Hindí above bull, *Samasa Dín.*
Rev. above horse *Ha* and no other letter of Hamírah.

This type is quite new.

No. 10. Obv. *As Sultán ul Azim Shams ud Dunyá wa 'd Dín.*

Rev. Horseman, to right of which *Eltatamsh,* and above horseman *us Sultán.* Thomas' coin had not any inscription in front of the horse. I have seen several of this type.

No. 11. Obv. (*Shams*) *ud Dunyá wa* (*ud Dín*) *Eltatamsh as Sultán.*
Rev. Horseman and *Srí Hamírah.*

No. 12. Obv. *As sultán ul 'Azim Eltatamsh as sultán.*
Rev. Horseman at charge.

No. 13. Obv. *Shams ud Dunyá wa 'd Dín Abú 'l Muzaffar us Sultán.*

Reverse, not given.

These three coins Nos. 11, 12 and 13 give more than do Thomas' Nos. 47, 46, and 48. A comparison of them with Thomas' coins will at once show the additional information these supply.

No. 14. This is the same as Thomas' No. 50, with the addition of the word *as Sultán* on the obverse plainly visible.

Nos 15, 16, 17, 18 show at one view four types of coins of Elduz, the general of Muhammad bin Sám. Three of them are binominal.

No. 15. Obv. *Muizz ud Dunyá wa 'd Dín, Abd Yalduz.*
Rev. Bull over which "*Srí Muj,*" in Hindí.

There cannot be much doubt about the reading of the Hindí. Srí Hamírah it cannot be. It is an attempt I think by a Musalmán at *Srí Muizz.*

No. 16. Obv. *Muizz ud Dunyá wa 'd Dín.*
Rev. *Abd Yalduz.*

There are floral ornaments about the inscriptions.

No. 17. A similar coin to *Ariana* Antiqua, Pl. XX, fig. 18, but much fuller.

Obv. "*As Sultán ul Ạzim Muizz ud Dunyá wa 'd Dín.*"

Rev. *'Abdu 'l Malik ul Muazzim, Táj ud Dunyá wa 'd Dín Yalduz.*

No. 18. Obv. "*As sultán ul Muazzim Abú' l Fath Yalduz as Sultán.*

Rev. Horseman with remnants of *Srí Hamírah* and Star underneath horse.

Plate II. No. I. Gold Mohur of Sher Sháh. Obv. in Mahrábí area "*As Sultán Sher Sháh, khallad Allah Mulkahu.*" Rev., in square area, the Kalimah. Both margins are illegible: this is a great pity, as the coin is in every other respect one of great beauty.

No. 3. Obv.—"*Sultán Sher Sháh, zarb i Sambhal.*" Margin obliterated. Rev. not given.

No. 4. Obv.—"*Sultán Sher Sháh, zarb i Alwar.*"

These are two new mints of Sher Sháh.

No. 5. Rupee of Sher Sháh. Circular areas on both sides. Obv. "*Sher Sháh Sultán, khallad Allah &c.*"

Margin:—"*Faríd ud Dunyá wa 'd Dín abú 'l Muzaffar*"
and in Hindí, *Sher Sháh*, and in Arabic figures 949. Rev. the Kalimah: Margin, the names of the four companions: and "*As Sultán ul Ạdil, zarb Ujain.* This is also a new mint of Sher Sháh's.

No. 6. Rupee of Sher Sháh's: Square areas surrounded by double lines.

Obv. *Sher Sháh Sultán, khallad Allah mulkahu.*" Margin "*Faríd ud Dunyá wa 'd Dín, zarb i Shergaṛh*, in Hindí "*Sher Sháhi.*"

Rev., kalimah in area. Margin, the names of the four companions and their titles. This coin has not been figured before. Unfortunately mine has lost a piece out of its centre and it has not been mended very cleverly. But the workmanship is very superior.

No. 7. Rupee of Kutub ud Dín Mubárak Sháh. New type.

Obverse: "*Al Imám ul Ạzim, Kutub ud Dunyá wa 'd Dín, Abú 'l Muzaffar, Khalífatu'lláh.*"

Rev. central area: "*Mubárak Sháh as Sultán, ibn us Sultán Al Wásiq billah, Amír ul Mominín.*"

Margin.—"*Zarb házá il Fizzat bi Hazrat dár il Khiláfat, Fí sanat, saba ashrata wa saba míata.*

This coin has on it exactly the same as Thomas' No. 146. But his is a square piece. On Mr. Delmerick's coin are similar inscriptions, with the mint place however termed "*dár ul mulk,*" not "*dár ul khiláfat.*"

No. 8. Gold coin of Gyás ud Dín Tuglaq. This coin is the same as Thomas' No. 158. In his coin the margin stops short when it gets to the mint. This goes on three words "*fi mulk i Talang.*" It was struck in Telingana.

No. 9. A gold mohur. Rev. *Mahmúd Sháh, bin Muhammad Sháh bin Tuglaq Sháh as Sultán* 752."

Obv. *Fí zaman i Amír ul Mominín, Gyás ud Dunyá wa 'd Dín, Abú 'l Muzaffar.*"

When Muhammad Tuglaq died, Fíroz Sháh was with him at Tatta in Scinde. Ahmad Ayáz Khwájah i Jahán set up in Dehli a boy of six years of age as king. Ferishta says that he was called Gyás ud Dín *Muhammad*, but the coin shows that his name was *Mahmúd*. On Fíroz Sháh's arrival in Dehli Mahmúd was deposed.

No. 10. New type of Ala ud Dín Khwárizmí's coin struck at *Kishm.* Obv. "*Kishm, Ala ud Dunya wa 'd Dín, Muhammad bin us Sultán.*" Rev. horseman by side of spear "*(A)mír.*" Above the horse "*ul Ạzim.*"

No. 11. Obv. "*(Saif) ud dunyá wa 'd Dín, Abú ul Muzaffar, al Hasn, bin Muhammad.*"

Rev. Bull on which "*Kirmán,*" over it in Hindí *Srí H ?*"

No. 12. Obv. "*Násir ud dunyá wa 'd Dín, Abú 'l Muzaffar.*

Rev. "*Muhammad bin Hasn Karlagh.*"

No. 13. Obv. in Hindí round a bull "*Srí Jalál ud Dín.*" On the bull in Arabic "*Kirmán.*"

Rev. Horseman over which words which may be Hindí "*Srí Hamírah,* but they look like Persian "*Farmán rawá.*"

These last four coins are all new types. *Kirmán** may be the Persian province and town. Jalál ud Dín Khwárizmí went there by way of *Mekrán* after he left India. At least so says the author of the "*Rauzat us Safa.*"

No. 14. Obv. "*Khalífatu Rabb il Ạlamín Kutub ud Dunyá wa 'd Dín.*"

Rev. "*Abú 'l Muzaffar Mubárak Sháh as Sultán ibn us Sultán Al wásiq billah.*"

No. 15. Obv. "*Al Mujáhid fi sabíl i 'llah Muhammad Tuglaq.*" Above, "*Abubakr ;*" to right, "*Alí ;*" to left "*Umr*" under "*Othmán.*"

Rev. the Kalimah in a circle. Margin: "*Zarb házá us Sikka, bi Ḥazrat Dehlí, fi sanat Khams asharín wa saba miata.* This coin is a very much better specimen than the one given in Thomas which was struck in *Dár ul Islám.*" Thomas calls his *unique*, but I have one also struck at "Dár ul Islám," and during the last five years I have seen about half a dozen of them. *Dehlí* and *Dár ul Islám* were favourite mints of Muhammad Tuglaq, but I have coins of the type of No. 159 in Thomas that were struck at not only these two places, but at "*Takhtgáh i Dehlí,*" "*Arsa i Satgáwn,*" and at "*Iqlím i Tuglaqpúr urf* (known = *i. e.*) *Tirhut.*" There are coins extant which were struck at *Daulatábád.* Thus there were six mints of this one type of coins. The simply *Dehlí* marked coins and the *Tuglaqpúr* and *Satgáwn* types have not yet been published. Thomas' No. 173 was struck at Dehli. The Lahore Museum possesses three similar gold mohurs. Of these, two were struck in 734 and one in 735 and all at *Satgáwn* in Bengal.

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* Thomas identifies it with *Kurrum* near Bunnu. *Kishm* is I suppose the island and town at the entrance to the Persian Gulf. If so, there is no reason why *Kirmán* should not be the Persian one, except this one, that here we have coins struck in Hindí.

In Sir Alexander Burnes' "*Travels in Bukhara*" Vol. II, two plates of coins are given. This book was printed in 1834. Masson's researches in Afghanistán produced over 60,000 coins. From them Wilson compiled the Ariana Antiqua which contains 21 plates of coins, Grecian, Greco-Bactrian, Indo-Scythian, Sassanian and Indian. General Cunningham in his "Coins of the Successors of Alexander in the East" gives fourteen plates which deal only with Grecian and Greco-Bactrian coins. Late discoveries have produced so many new coins that a supplement equal in size to the original book might easily be published. The coins of each dynasty that has reigned in India supply matter enough for a volume. These coins are purchased by private individuals and of course kept in their cabinets, each new type being hailed with numismatic delight. When these private individuals go home, of course they take their acquisitions with them. So that private enterprise in Indian numismatics simply robs the country of its treasures. When a poor student wishes to see the coins about which he reads, he cannot do it. The museums have not got them. The Calcutta Museum is I am credibly informed destitute of coins. It seems to me there is only one way of meeting this difficulty. The Museums of India must have grants made to them for the purchase of coins just the same as Museums at home have. The Berlin museum gets everything good in Europe, simply because it gives good prices. Here in India those who can pay get the best coins. And if the Government of India desires that the museums should possess cabinets of coins, men must be appointed and money granted, or nothing will ever be done except opportunities lost.

I have shown above how our knowledge of the different kinds of coins has increased. What I desire to see is an increase in the number of coins in our museums.

Copper Coins of Akbar. *By* CHAS. J. RODGERS, *Amritsar.*

(With two Plates.)

In this paper I propose first to make a list of the coins I have drawn in the two plates accompanying this paper and secondly to offer a few remarks which seem to suggest themselves from a study of the inscriptions on the coins.

No.	Wt. in grs.	
1	108	Obv. *Do tánke i Akbar Sháhí.* Rev. *Zarb i Ágrah, (Shahrewar ?)* 50 *Ilahí.*
2	109	Obv. *Do tánke i Akbar Sháhí.* Rev. *Zarb i Ágrah, Azr* 46 *Ilahí.*
3	59	Obv. *Yak tánke i Akbar Sháhí.* Rev. *Zarb i Láhor* (?) 46 *Ilahí.*
4	76	Obv. *Dám.* Rev. 33 *Ilahí.*
5	326	Obv. *Zarb i Fulús i Nárnol.* Rev. *Fí san i Nuhsad wa shast,* 963.
6	318	Obv. *Zarb i Fulús i dár us saltanat, Ahmadábád.* Rev. *Fí san i Nuhsad wa hashtád wa shash.*
7	311	Obv. *Zarb i Fulús i Dehlí.* Rev. *Nuhsad wa hashtád wa yak.*
8	319	Obv. *Zarb i Fulús i Dár us saltanat, Fathpúr.* Rev. *Fí san i nuhsad wa hashtád wa nuh,* 989.
9	325	Obv. *Fulús i Dár us saltanat Láhor.* Rev. *Fí san i nuhsad wa hashtád wa haft,* 987.
10	314	Obv. *Zarb i Fulús i Hissár Firozah.* Rev. *Fí san i nuhsad wa nawad wa shash,* 996.
11	317	Obv. *Fulús i Dár ul Khiláfat, Lakhnau.* Rev. *Fí san i nuhsad wa hashtád wa nuh,* 989.
12	321	Obv. *Urdú Zafarfarín.* Rev. *Zarb i Fulús. Alif* = 1000 A. H.
13	317	Obv. *Zarb i Fulús i Láhore.* Rev. *Farwardín,* 39 *Ilahí.*
14	312	Obv. *Zarb i Fulús i Multán.* Rev. *Urd i bihisht,* 41 *Ilahí*
15	318	Obv. *Zarb i Ilahábás.* Rev. *San i,* 36 *Ilahí.*
16	308	Obv. *Zarb i Fulús i Dehlí.* Rev. *Farwardín,* 38 *Ilahí.*
17	315	Obv. *Zarb i Fulús i Urdú i.* Rev. *Zafarfarín,* 42 *Ilahí.*
18	327	Obv. *Zarb i (Gobi)ndpur, Sikka i Akbar Sháhí.* Rev. *Urd i Bihisht,* 46 *Ilahí.*
19	315	Obv. *Dokání ?* or *Dogánw ? Sikka i Akbar Sháhí.* Rev. *Urd i Bihisht,* 44 *Ilahí.*

No.	Wt. in grs.	
20	316	Obv. *Zarb i Fulús i Attak Banáras.* Rev. *Amr Dád,* 37 *Ilahi.*
21	295	Obv. *Zarb i Fulús i Láhor.* Rev. *Shahrewar,* 43 *Ilahí.*
22	39	Obv. *Zarb i Fulús i Láhor.* Rev. ——— 38 *Ilahí.*
23	37	Obv. *Zarb i Fulús i Nárnol.* Rev. *Nuhsad wa shast wa nuh.*
24	149	Obv. *Fulús i Kábul.* Rev. *San,* 33 *Ilahí.*
25	385	Obv. *Fulús.* Rev. *Urdú zafarfarín.*
26	140	Obv. *Zarb i Dár ul Khiláfat, A'grah.* Rev. *Fí san i nuhsad wa shast wa.*
27	40	Obv. *Damrí.* Rev. 33 *Ilahí.*
28	625·5	Obv. *Zarb i Dehlí, Sikka i Akbar Sháhí.* Rev. *Máh i zí,* 43 *Ilahí.*

28*a*. The space between the two lines shows the thickness of No. 28.

It will be at once seen that each of these coins with the exception of No. 26, has its own designation upon it. Thus Nos. 1 and 2 are called *do tánke* pieces; No. 3 is a *yak tánke* piece. No. 4 is a *dám*. Nos. 5—17 inclusive and Nos. 22—25 inclusive are *fulús* pieces. No. 27, is a *damrí*. Nos. 18, 19 and 28 are called *Sikka i Akbar Sháhí*. The term *fulús* is applied to coins varying from 37 to 326 grains, one struck at Kábul weighing 149. The word *falas* in Arabic means want, indigence, hence *fals* or *fils*, a small coin, an obolus, money given to relieve poverty, or small change or copper, as we say in English.* *Fulús* is the plural of *fals*. The first coin I have seen with *fulús* upon it is dated 946 A. H. It is evident that a term used so loosely as is this one could never have been brought forward in accounts or revenue statements.

Again the *sikka* has three weights 625·5 grains and 327 and 315 grs. I have three which I have not figured which weigh little more than 37 grains each. Hence *sikka* could not well be used as a definite value.

We have left the *dám*, *damrí* and *tánke*. We know that the last of these was a name applied to coins from the time of Mahmúd of Ghazní. We know also that *tánkes* were of two kinds, silver and copper. The weights of *tánkes* varied as did also their values. The *tánkes* of Sikandar Lodí were of different mixtures of silver and copper. Sometimes they contained only a little more than a grain and a half of silver in each, sometimes as much as eight grains and sometimes as much as sixteen, seventeen or even thirty-two. Hence it is evident that such coins could not be used in revenue returns. It became incumbent on Akbar, therefore, when he made a demand from his ministers for revenue returns to fix a standard. The *yak tánke i Akbar Sháhí* seems to be such a standard value. In the *Aín i Akbarí* we are told that the *dám* was a coin of the value of five *tánkes.* And further we are told that there were forty *dáms* to the rupee. Hence we may judge that there were 200 *tánkes* to the rupee. Now the total revenues of Akbar are put down by Nizám-uddín at 640,00,00,000 *tánkes.* This at the rate of 200 to the rupee would be equal to 3,20,00,000 rupees or £3,200,000.

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* [This derivation is doubtful. For *fals* signifies a fish scale as well as a copper coin. Ed.]

Now in our list of coins we have a *dám* which weighs only 76 grains. And Abúl Fazl gives Akbar's revenues as 5,67,63,83,383 *dáms.* Now if a coin of 59 grains is valued at 200 to the rupee, a coin of 76 grains would be worth about 160 to the rupee. According to this account Abúl Fazl's statement stands at about 3 krors 54 lacs of rupees or £3,540,000.

These statements are small compared with those arrived at by Thomas who makes the first equal to 32 millions and the latter to 16 millions, a discrepancy rather startling. And the magnitude of the sums is somewhat appalling. For when we turn to the prices of the produce of the land we are astonished to find that wheat sold for two maunds per rupee, barley at four maunds, mutton at about a fortieth of a rupee per ℔. And we must remember that nearly all Akbar's revenues were from land.

Now if things sold so cheaply there must have been a vast amount of land under cultivation, in order to realize a revenue of £32,000,000, which is only a fractional part of the value of the whole of the crops. And India in those days must have been an enormously rich country, for Akbar had only a fraction of it in hand.

Thomas in his calculations does not give one coin of Akbar's. He gives statements from contemporary writers. These men were often wrong. Certainly five *yak tánke* pieces of 59 grains could not be equal to the *dám* of 76 grains.*

Akbar's copper coins seem to follow the copper coins of the Súri dynasty. Sher Sháh put an end to a mixed currency. But on no one of Sher Sháh's copper coins have I as yet been able to find a coin-name.

Abúl Fazl's statement is for the year 1003 A. H. or Akbar's 40th year and Nizám-uddín's is for 1002 or for his 39th year. The *dám* I figure is for the 33rd year and the *yak tánke* piece is for the 46th year. It is quite possible that these values were those the authors had in view.

I leave this part of the subject. It is one of great importance and one on which authorities differ widely. If Akbar out of the portion of India which he conquered could realize three hundred years ago 32 millions sterling, he in fact realized more than the English Goverument of India now does. For if we take away from the revenue all the extra sources which have accrued to it since the time of Akbar we leave a much smaller amount for land revenue simple than that realized by the third Mogul. I strongly suspect that the whole of these returns are paper sums which were never realized.

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* See note on page 191.

Let us now look at some other features in the coins :—the mint towns claim a word. They are A′grah, Láhor, Nárnol, Ahmadábád, Dehlí, Fathpúr, Hissár Firozah, Lakhnau, Urdu Zafarfarín, Multán, Ilahábás, Gobindpur, Dogánw (?), Attak Banáras, Kábul, in all sixteen mints. I have in my cabinet some half dozen to-me-illegible mints more of Akbar. In the Lahore Museum is a great heap of Akbar's large copper *fulús*, as yet unarranged.

Nárnol is not given in Thomas, neither is Fathpúr or Dogánw or Gobindpúr. Fathpúr is Fathpúr Sikrí near A′grah. It rejoices in the title of Dár us Saltanat on both gold and silver coins of Akbar. I have one rupee of Sháhjahán struck at the same place. Attak Banáras is undoubtedly Attock on the Indus ; for interesting remarks on this place I must refer the reader to General Cunningham's Archæological Survey Report, Vol. II, pp. 93, 94.

The years and months deserve notice. No sooner had Akbar proclaimed the change in the year than he began to strike coins according to his new system. The coins of the year 30 Ilahí are very rare indeed. I have two rupees of that year but no copper coins. (This was the year of the change.) Akbar reverted to Kalimah rupees after this. His square rupees with *alif* (= in Arabic 1000) are somewhat common. They all have the Kalimah on them. I have two square rupees of 1000 and 1001, with the date *in figures*, and with the Kalimah on them. The months also figure on the coins. Thus we have *Shahrewar*, *Azr*, *Farwardín*, *Urd i Bihisht*, *Amr Dád*, and *Zí*, or six months out of the twelve on the few copper coins here put forward. In rupees I have all the months. I am going to try to complete one year, having already of some years four months. I suppose the dies used must have needed constant replacing. Some of them were very sharp and deep and would soon be the worse for wear.

Of some places I have only figured one coin. I have several of most of them. Thus of Narnol I have four and five of 963, and one of an illegible mint of 966. The whole of the 50 years of Akbar's reign are I believe obtainable in all the metals, gold, silver and copper. I have every year in rupees, except 965. During the last five years I have come across many mohurs of different years. Some of these are of rare beauty. Systematic research ought to bring these to light. The British Museum has *dirhams* of the Khalifahs which go year by year from the commencement of their minting to the time when they ceased striking. And what makes these series the more interesting is the fact that each mint is thus represented year by year, sometimes for nearly a hundred consecutive years. In India, one object to be had in view is a complete series of coins of all the Sultáns whether Paṭhán or Mogul, and of the Mahárájahs and Rájahs. Another object should be series of local mints. Thus Lahore, from the time of Mahmúd of Gazní to that of the latter Moguls, was a very famous mint town. But in the museum of that city no attempt has been made to secure complete series of Lahore coins. Those of the early Moguls are of great beauty and deserve to be gathered. The large mohurs and square rupees of Jahángír struck at Lahore are most especially worthy of notice. Of course the price of such coins would amount to a large sum. But if a museum is worthy of being kept up, surely the things in it should be worth looking at. The coins in the Lahore Museum are now being catalogued, and when the catalogue is issued, the deficiencies and redundancies of the collection will be seen at once. It is to be hoped that when the deficiencies are made manifest, some attempt will be made to make them good.

For coins Nos. 1 and 3, I am indebted to Dav. Ross, Esq., Traffic Manager, Scinde, Punjab and Dehli Railways for permission to make copies of them. For permission to draw No. 28, I am indebted to Mr. Ibbettson, C. S. of Kurnál.

With respect to the *fulús* coins I may add that these are probably the the coins of which Bernier says that Aurungzíb had bags of 1000 *peyssas* ready for distribution. In a loose fashion the term *dám* seems also to have been given to the large *fulús* pieces. And generally we see that with respect to Akbar's copper coins there was a want of definiteness which precludes the possibility of arriving at exactness with respect to his revenues. For we must always remember that copper was the standard of value in Akbar's time.

Note.—There is some confusion in the names of the copper coinage of the East India Company. Accounts are kept in rupees, annas and pies. There are 12 pies to an anna. But on the quarter anna we have in Persian distinctly یک پای one pie. According to this therefore there are only four pies in an anna. The coin we call a pie has on it in Persian ثلث پای *ṣulṣ páí*, the third part of a pie. If the accounts of the Company had been kept in pies only, there would have been tremendous confusion until the value of the pie had been fixed.

The modern pice weighs about 100 grains. Hence a rupee is worth about 6400 grains. If a *dám* weighed 320 grains and a rupee were worth forty *dáms* then in Akbar's time a rupee represented 12,800 grains. But if also the *dám* weighed 80 grains only, and there were 160 of them, the same result is arrived at. Now nearly the same result is arrived at with reckoning the rupee to be worth 200 *tankes* at 60 grains each.

If the relative values of silver and copper were the same in Akbar's time as now, then taking our coins the *tánke* and *dám* at 60 and 80 grains we have 106 and 80 to the rupee respectively. Taking these values, which are probably the correct ones, the revenues of Akbar according to Nizám-uddín and Abúl Fazl are £6,000,000 and £7,095000 respectively.

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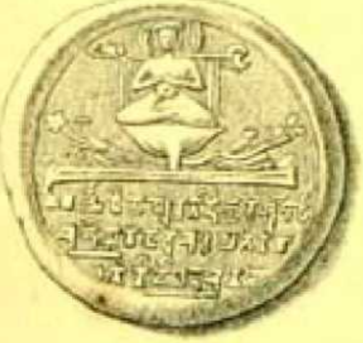

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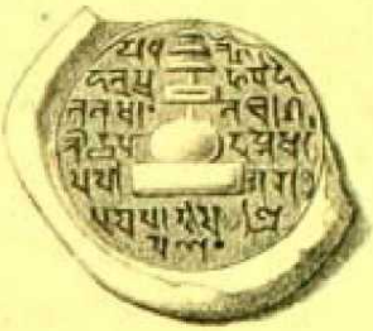

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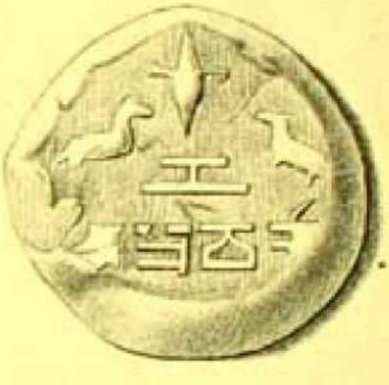

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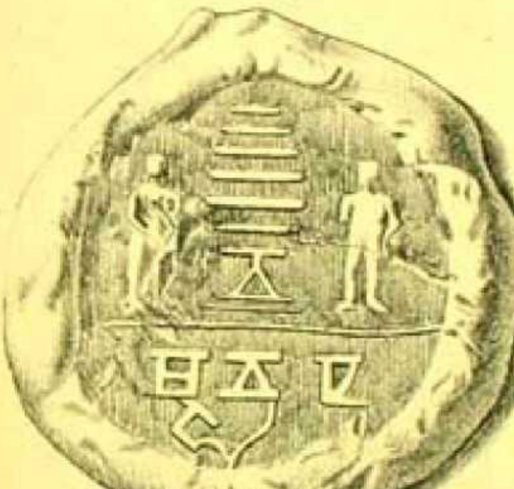

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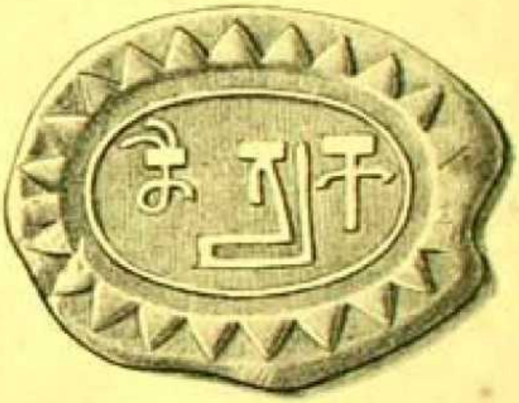

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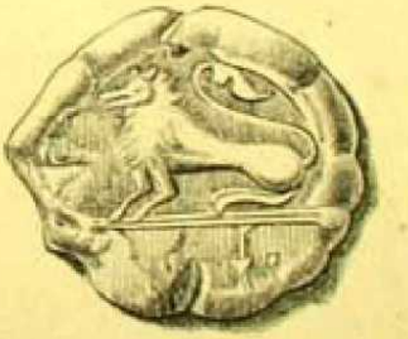

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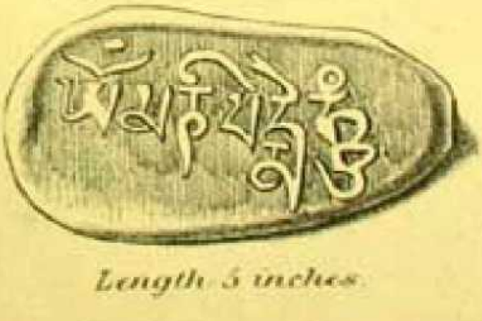
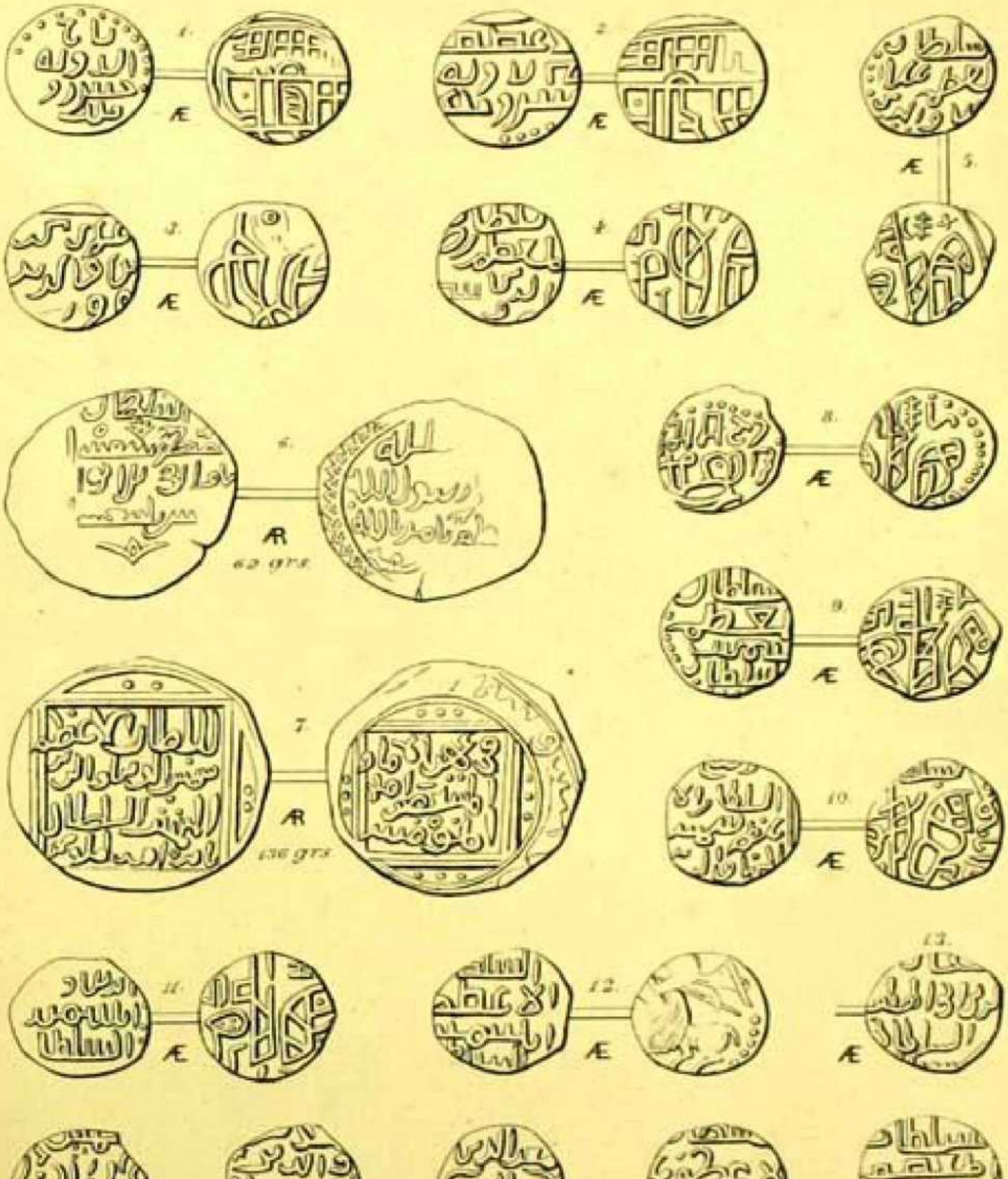


Length 5 inches.

[All full size except No 7.]

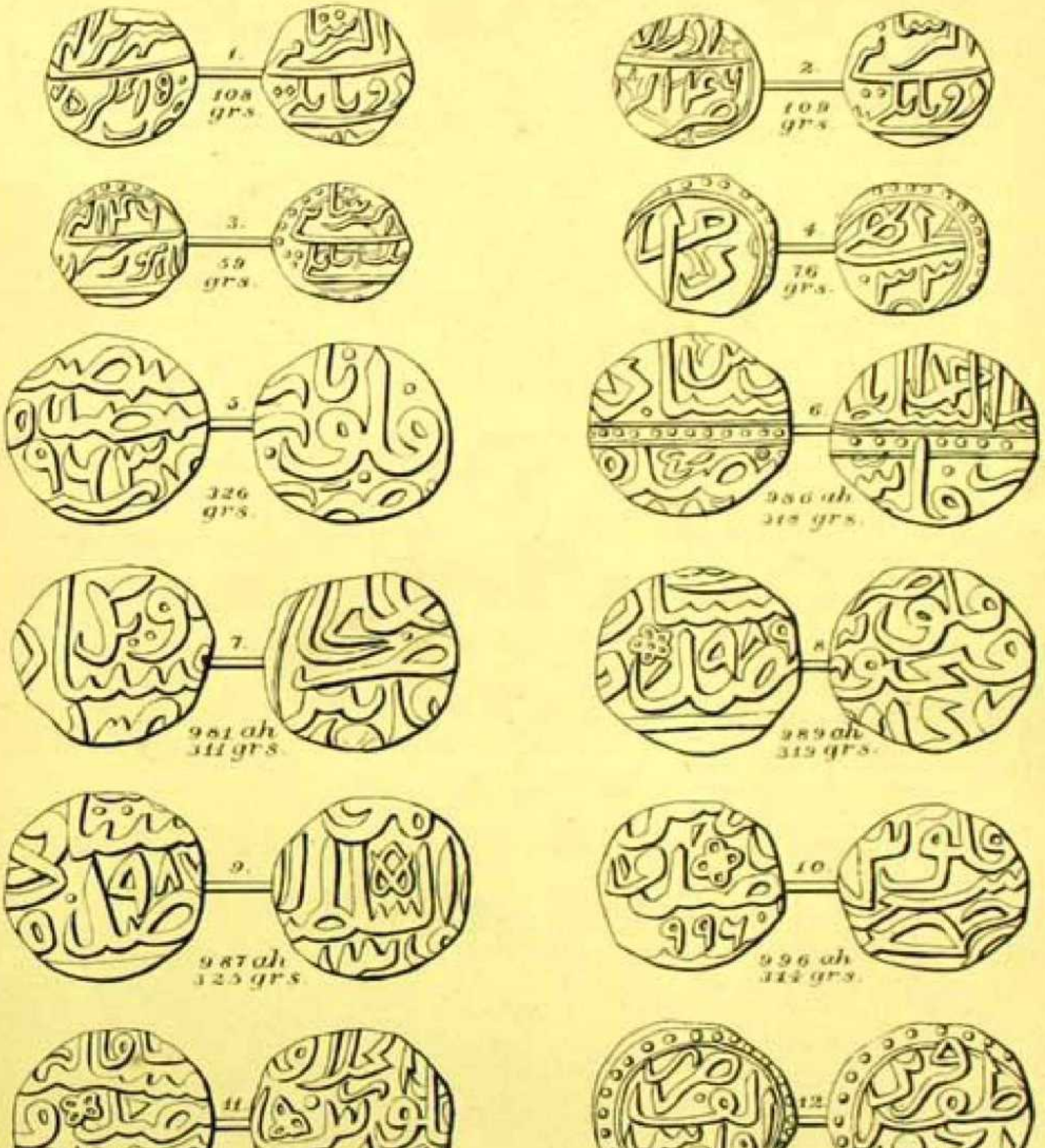
Lith. & Printed by W. Newman & Co. Calcutta

CLAY SEALS ETC. FOUND AT SANKISA AND OTHER BUDDHIST
RUINS IN N. W. PROVINCES OF INDIA



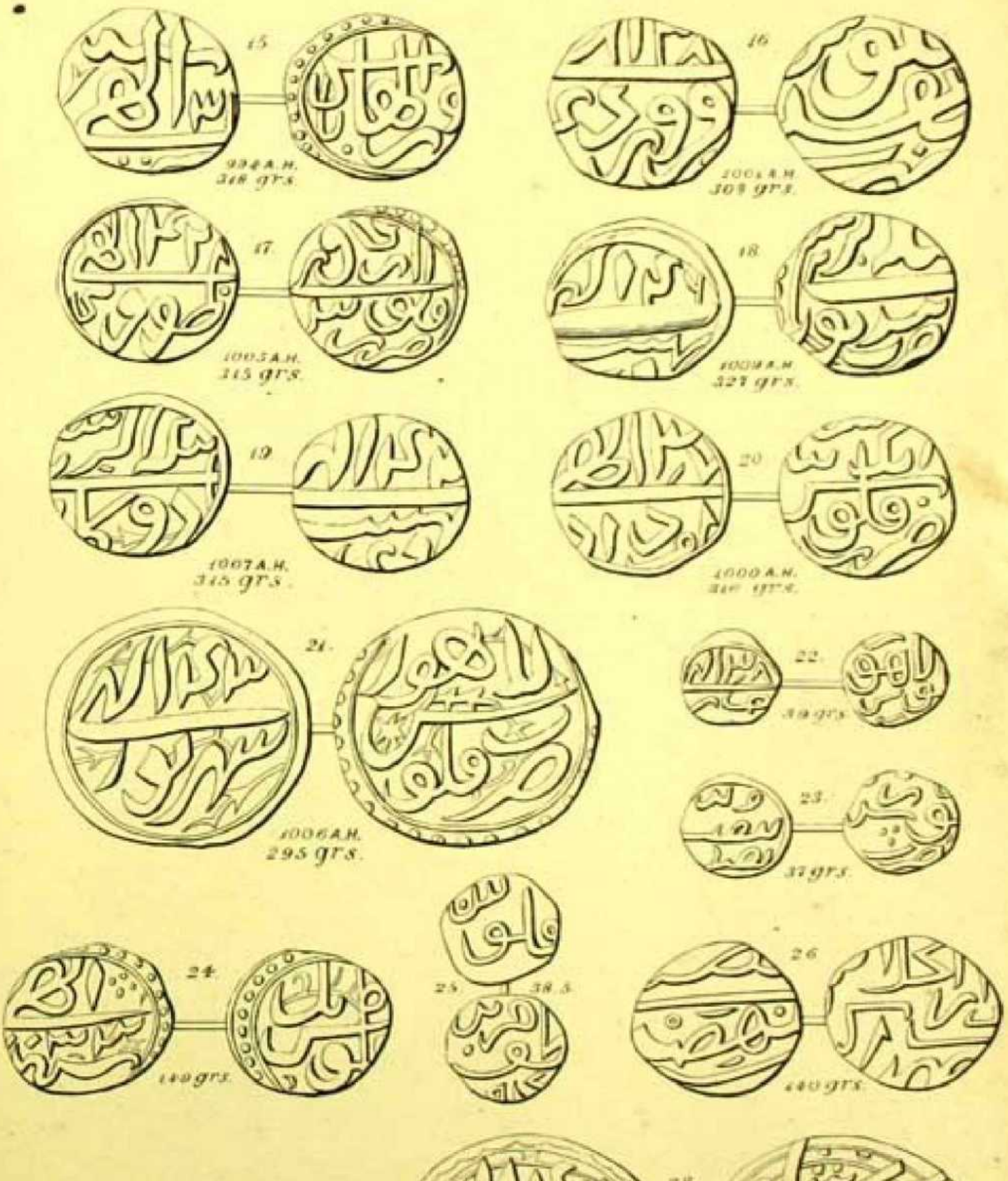
C. J. Rodgers del. W. Newman & Co. lith.

COINS SUPPLEMENTARY TO "THOMAS CHRONICLES OF PATHĀN KINGS."



C. J. Rodgers, del.

COPPER COINS OF AKBAR.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994 A.H.
318 grs.
16.
1001 A.H.
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321 grs.
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1007 A.H.
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21.
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39 grs.
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149 grs.
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1006 A.H.
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C. J. Rodgers, del. W. Newman & Co. Lith.

COPPER COINS OF AKBAR.

A SKETCH

OF THE

TURKI LANGUAGE

AS SPOKEN IN

EASTERN TURKISTAN

(Kàshghar and Yarkand.)

BY

ROBERT BARKLEY SHAW, F.R.G.S.,

Political Agent, *late on special duty at Kàshghar*,
Gold Medallist, Royal Geographical Society.

PART II.
VOCABULARY,
TURKI—ENGLISH.

WITH LIST OF NAMES OF BIRDS AND PLANTS BY J. SCULLY, ESQ.,
SURGEON, H. M. BENGAL ARMY *(late on special duty, at Kàshghar)*.

Extra Number to Part I of the Journal, Asiatic Society of Bengal.

CALCUTTA:
PRINTED BY J. W. THOMAS, AT THE BAPTIST MISSION PRESS.
1880.

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

Part I.—HISTORY, LITERATURE, &c.

EXTRA NUMBER

To Part I for 1878.

A Vocabulary of the Language of Eastern Turkistán.—By R. B. Shaw, *Political Agent. With two Turkí Vocabularies of Birds and Plants by* J. Scully, Esq., *Surgeon, H. M. Bengal Army (late on special duty, Kàshghar).*

Abbreviations :—P. signifies Persian derivation ; A. Arabic ; T. Turki ; Kaz. Kh. K. and Y. signify respectively that the words so marked are used in the Kàzzàk, Khoqand, Kàshghar, and Yarkand dialects. P. T. means partly Persian, partly Turki, &c. *Rec.* and *coll.* mean *reciprocative* and *collective*, *tr.* and *intr.* signify *transitive* and *intransitive*, *refl.* and *pass.* stand for *reflective* and *passive*, *caus.* stand for *causative* ; *p. p.* means *post-position*, *prd.* stands for *pronounced*, *pron.* for *pronoun*.

آباد چیلیق	*ábád-chi-liq* (subs.) a well-inhabited or cultivated place, P. T.
آباد لیق	*ábád-liq* (subs. and adj.) an inhabited place ; inhabited, cultivated, P. T.
آبدان	*ábdan* (adj.) good.
آبگار	*ábgar* (adj.) occupied, full of care, busy.
ابوز	*abuz* (adj.) learned, well-read.
ابوشقا	*abushqa* (adj.) old, advanced in years.
اپ	*ap*, intensive particle prefixed to *àq* "white."
آپا	*ápa* (subs.) elder sister.
اپارتماق	*apár't-máq* (v. caus.) to cause to take away (from following).
اپارماق	*apár-máq* (v. tr.) to take away [contr. from *alip-bármák*].
آپتاب	*àptáb* (subs.) the sun, (for *aftáb* P.).
آپتابه	*àptába* (subs.) a disk-shaped basin for hand-washing, (for *àftába*, P.).
آپتابهچي	*Aptába-chi or Abtaba-chi* (subs.) Basin-bearer, the title of a high dignitary at the Court of Khoqand (spelt by the Russians *Autobashi*).
ابقوت	*apqut* (subs.) the back part of the boot above the heel.

آت *àt* (subs.) name.

آت *át* (subs.) horse.

ات for اتر *which see.*

اتا *atá* (subs.) father.

اتابيك *atá-beg* (subs.) father-king, patriarch (the name of a Persian dynasty).

اتاداش *atá-dash* (adj.) of the same father.

آتاشماق *át-a'sh-máq* (v. rec.) to name together; to assign to, to entitle so and so to.

آتاغ *átágh* (subs.) renown, high name, sur-name, title; *also* nick-name.

آتاغلاشماق *átágh-la'sh-máq* (v. coll.) to combine to give a name.

آتاغلاماق *átágh-la-máq* (v. tr.) to give a name, sur-name *or* nick-name.

آتاغليق *átágh-liq* (adj.) called, sur-named.

آتاق *átáq* (subs.) same as *átágh.*

آتاقلاشماق *átáq-la'sh-máq* (v. coll.) same as *átágh-lash-mák.*

آتاقلاماق *átáq-la-máq* (v. tr.) same as *átágh-la-máq.*

آتاقليق *átáq-liq* (adj.) same as *átágh-liq.*

اتاليق *atá-liq* (sub.) one who is in the place of a father, a guardian, tutor. Title of a high official in Turkistàn.

آتاماق *át-a-máq* (v. tr.) to give a name to, to name.

آتانماق *át-a'n-máq* (v. pass.) to be given a name to, to be named, to be renowned.

آتباش چاي *átbásh-chái* (subs.) a sort of Tea compressed like brick-tea, but into large cylinders.

آتتورماق *át-tur-máq* (v. caus.) to cause to throw, to cause to beat out cotton (from *át-máq*).

آتداش *át-dásh* (subs. and adj.) name-sake, having the same name.

آتقوچي *át-qu-chi* (subs., from *át-máq*) a thrower, a shooter; *or specially,* a thrower or beater out of cotton.

آتقورماق *át-qur-máq* (v. caus.) the same as *át-tur-máq,* (but without its special meaning of beating out cotton).

آتقوزماق *át-kuz-màq* (v. caus.) the same as *at-qur-maq.*

آتقولاق *át-qu-làq* (subs.) a kind of grass of which tinder is made.

آتلاماق *át-la-máq* (v. tr.) to stride across, to step over.

آتلاندورماق *át-la'n-dur-máq* (v. caus.) to cause oneself to bestride, *viz.,*

آتلانماق *át-la'n-màq* (v. intr. or refl.) to be astride, to bestride, to sit *or* mount on horse back, to ride.

آتليغ	*át-ligh*—1, (subs.) a rider, cavalier ; 2, (adj.) named, called.
آتليق	*át-liq*, the same as *at-ligh*.
آتماق	*át-máq* (v. tr.) to throw, propel, project, shoot ; *also* to spin.
آتميش	*át-mish* (num.) sixty (for *alt-mish*).
آتيز	*átiz* (subs.) a bed, *or* portion of land divided off for irrigation.
آتيشماق	*át-ish-màq* (v. rec.) to throw, &c., at one another.
آتيلماق	*át-il-màq* (v. pass.) to be thrown *or* shot ; (of a gun), to go off.
آچ	*ách* (adj.) hungry.
اچ	*ich* (subs.) the interior, the inside.
آچارچيليق	*áchár-chi-liq* (subs.) famine (? from *ach-ár*, the continuative of *àch-màq*).
اجراتماق	*ajra-'t-máq* (v. caus.) to cause to be in a divided state, to divide.
اجراشماق	*ajra-'sh-máq* (v. rec.) to divide from one another.
اجرالماق	*ajra-'l-máq* (v. pass.) to be divided, separated.
اجراماق	*ajra-máq* (v. intr.) to be in a divided condition.
اجريق	*ajriq* (subs.) dhub grass (whose roots run along underground).
اجو	*aju* (subs.) a black bear.
آچقو	*ách-qu* (subs.) a key, *i. e.* opener (from *àch-màq*).
آچليق	*ách-liq* (subs.) hunger (from *ách*.)
آچماق	*ách-máq* (v. tr.) to open.
آچماق	*ách-máq* (v. tr.) to be hungry.
آچوق	*àch-uq* (v. adj.) open.
اچيتماک	*ach-it-mak* (v. caus.) to cause to become bitter or sour (see *achi-mak*).
آچشماق	*ách-ish-màq* (v. rec.) to open to one another, or with one another.
اچيشماک	*ach-ish-mak* (v. rec.) to be made sour together (see *achi-mak*).
اچيغ	*achigh* (adj.) sour, bitter, angry.
اچيغ تاش	*achigh-tásh* (subs.) alum.
اچيغلاتماق	*achigh-la't-máq* (v. caus.) to cause to become angry.
آچيق آچوق	*áchiq* or *áchuq* (adj.) open.
آچيق ليق	*áchiq-liq* (subs.) openness, candour, good humour.
اچيق تاش	*achiq-tash* (subs.) alum.
آچيقماق	*áchiq-màq* (v. intr.) to be hungry.

آچیلماق	*ách-il-máq* (v. pass.) to be opened.
اچیماك	*achi-mak* (v. intr.) to become sour ; to smart (as a wound).
آختا	*ákhta* (adj.) castrated.
آختاچي	*ákhta-chi* (subs.) castrator.
آختارتماق	*ákhtar-t-máq* (v. caus.) to cause to search, or seek.
آختاریشماق	*ákhtar-ish-máq* (v. rec.) to search one another.
آختاماق	*ákhtar-máq* (v. tr.) to search, seek.
آخشام	*ákhsham* (adv.) last night, yesterday evening.
آخشامليق	*ákhsham-liq* (subs.) the evening of this day, this evening.
اخلات	*akhlát* (subs.) sweepings.
آخورماق	*akhur-máq* (v. tr.) to shout, to call loudly.
اداش	*adásh* (subs.) name-sake, (more specially) a friend, companion (for اتداش).
اداشماق	*adash-máq* (v. intr.) to lose the way.
آدرا قالسون	*adra-qálsun* (part of verb) May he remain uncared for [an imprecation] KAZ.
آدمچي ليك	*ádam-chi-lik* (subs.) humanity, kindness. P. T.
ادير	*adir* (subs.) uneven broken ground.
آديم	*ádim* (subs.) a pace, step.
آديملاشماق	*ádim-la-'sh-máq* (v. recip.) to pace against one another.
آديملاماق	*ádim-la-máq* (v. intr.) to pace, step.
ار	*ăr* [*ĕr*] (subs. and adj.) male, masculine, (see اير).
آرا	*ára* (subs.) the midst, the middle (often used with *da* adverbially). Expressions : *Ara-ga tüshmak* = to intervene ; *àra-ga sàlmàq* = to interpose ; *ára-gha kirmak* = to interfere, to intervene.
آرابه	*áraba* (subs.) a cart (generally with two wheels and shafts).
اراچالاماق	*àra-cha-la-máq* (v.) to separate.
آراده	*ára-da* (adv. & post-p.) in the midst.
آرال	*árál* (subs.) island. (Qu. passive form from *ára* "middle.")
آرالاتماق	*ára-la-t-màq* (v. caus.) to cause to visit or inspect [see *ara-la-màq*].
آرالاش	*ára-lash* (adv.) middle-wards, intermixedly, confusedly.

آرالاشتورماق	*ára-lash-tur-máq* (v. caus.) to cause to be mixed, to mix (trans.).
آرالاشماق	*ára-lash-máq* (v. intr.) to become intermixed.
آرالاماق	*ára-la-mák* (v. tr.) to inspect.
آراليق	*ára-liq* (subs.) a bribe, present [to one who intervenes *ára-ga* "in the midst"].
آرام آلماق	*árám-álmáq* (v.) to take rest, to repose, P. T.
آرامدان	*àràmadàn* (subs.) a tall tree whose leaves are made into Tea.
آران	*árán* (subs.) butter milk.
اران	*ărăn* [prd. *eren*] (adv.) unwillingly, reluctantly, with difficulty.
آرپا	*árpa* [often prd. *ápá*] (subs.) barley.
آربا	*ârba* (subs.) cart, waggon (see *áraba*).
آرباتاق	*àrba't-máq* (v. caus.) to cause to use incantations (for the purpose of curing wounds, &c.).
آرباشماق	*àrba'sh-máq* (v. recip.) to say charms in opposition to the supposed causes of ill, to say charms in company.
ارباق	*àrbá'q* (subs.) a spoken charm for curing snake bites, or procuring fine weather.
ارباقچي	*arbáq-chi* (subs.) one who uses such charms.
ارباماق	*arba-máq* (v. tr.) to say charms for curing bites, or procuring fine weather.
ارت	*art* (subs.) a low Pass, a water-parting *or* watershed, rising ground. *Often used in composition, as:* Kizil-art, Muz-art, &c. and often pronounced and written *at*.
آرتماق	*árt-màq* (v. tr.) to load (a horse, cart, &c.).
آرتماق	*árt-máq* (v. intr.) to remain over, to exceed.
آرتتورماق	*árt-tur-máq* (v. caus.) 1, to cause to load; 2, to cause to remain over.
آرتوغراق	*ártugh-ráq* (adj.) more [comparative of *artugh*, much].
آرتوق آرتوغ	*ártugh* or *ártuq* (adj.) excessive, much, many. (From *ártmáq*.)
آرتوقلوق	*ártuq-luq* (subs.) quantity, great amount (muchness).
آرتيش	*ártísh* (subs.) the pencil cedar, "Juniperus excelsa" KH.
آرتيشماق	*árt-ish-màq* (v. coll.) to aid one another in loading (from *art-máq*).

آرتیلماق *art-il-máq* (v. pass.) to be laden (said of the load); (of a man) to be carried hanging on to a horse without sitting on his back.

آرتینماق *art-in-máq* (v. refl.) ditto.

آرچا *árcha* (subs.) the pencil cedar [see *ártích*].

آرچیتماک *árchi-t-mak* (v. caus.) to cause to clear, &c., (see *archimak*).

[*mak*).

آرچیشماك *árchi-sh-mak* (v. recip.) to clear in company (see *archi-*

آرچیماك *árchi-mak* (v. tr.) to clear, to free from obstructions, to peel (as a fruit).

ارزانچي ليق *arzán-chi-liq* (subs.) cheapness, abundance, P. T.

ارزانلیق *arzán-liq* (subs.) ditto.

ارزیتماق *arzi-t-máq* (v. caus.) to cause to please.

ارزیشماق *arzi-sh-máq* (v. recip.) to please one another, to be agreeable to one another.

ارزیماق *arzi-máq* (v. intr.) to please, to be agreeable [gov. the person in *gha*].

ارسلان *arslàn* (subs.) a lion.

ارغا *argha* (subs.) remedy, aid, method of action.

ارغاسیز *argha-séz* (adj.) helpless, unfortunate.

ارغمچي *arghamchi* (subs.) rope, cord. (For following):

ارغمچین *arghamchin* (subs.) do.

رغوماق *arghumáq* (subs.) a large horse, a charger.

آرقا *árqa* (subs.) the back, the rear.

آرقاسیده *árqa-sí-da* (post-pos.) behind, after (lit. at its back).

آرقاغ *árqágh* (subs.) the woof (of a stuff), the cross-wise threads placed by the shuttle.

آرقاق *árqáq* (subs.) ditto. [support.

آرقالاماق *árqa-la-máq* (v.) 1. to carry on the back; 2. to back up,

آرقالانماق *árqa-la'n-máq* (v. p.) to be backed up, supported, &c.

آرقان *árqan* (subs.) rope, KAZ.

آرقاو *árqào* (subs.) the woof, KAZ.

آرکا *ărka* [prd. *ĕrka*] (subs.) a pet child.

ارکیشی *ăr* [*er*] *kishi* (subs.) a male person.

ارکاك	*ărkak* (subs.) a male [of animals as well as mankind].
آرماق	*ár-máq* (v. tr.) to separate, divide.
آرمانليق	*ármán-liq* (adj.) desirous, troubled with longing, P. T.
ارمن	*ărman* (subs.) a kind of tall grass, a weed.
اروتماق	*arü't-máq* (v. caus.) to make clean, to clean, to rub clean ; to peel.
اروغ	*arugh* (verbal adj.) thin, out of condition (from *aru-màq*).
اروق	*aruq* (adj.) ditto.
اروقچي ليق	*aruq-chi-liq* (subs.) thinness, want of condition.
اروق ليق	*aruq-liq* (subs.) ditto.
آروماق	*aru-máq* (v. intr.) to be tired, fatigued.
آرونماق	*árü'n-máq* (v. p.) to be cleaned.
اري	*ari* (subs.) a wasp.
آري	*ári*—1. (conj.) further, moreover, verily ; 2. (post-p.) beyond (see *nari*).
اريتماق	*arit-máq* (v. tr.) to clean [see *arüt-màq*] to cause to be clean.
اريماق	*ari-máq* (v. intr.) to be clean.
اريغ	*arigh*, 1 (adj.) clean, (from *ari-màq*) ; 2 (subs.) an artificial water-course.
اريغلاتماق	*arigh-la't-máq* (v.) to cause to be cleaned.
اريغلاشماق	*arigh-la'sh-máq* (v. recip.) to cleanse together *or* one another.
اريغلاماق	*arigh-la-máq* (v. tr.) to cause to become clean, to cleanse.
اريق	*ăriq* [prd. *eriq*] 1. (subs.) the whole ; 2. (adj.) clean.
آريق	*áriq*—1. (subs.) a water channel, small canal ; 2. (adj.) thin.
اريقلاماق	*ariq-la-máq* (v.) 1. [same as *arigh-la-màq*] ; 2. to become thin, out of condition.
اريق ليق	*ariq-liq* (subs.) 1. cleanness ; 2. thinness.
آريك	*ürik* (subs.) any thing sorted out *or* selected for its size.
آريكماك	*ürik-la--mak* (v. tr.) to sort out *or* select for size.
اريلماق	*ari'l-máq* (v. pass.) to be cleansed.
آريلماق	*ár-il-màq* (v. pass.) to be separated, divided (from *àr-màq*).
آريم	*ĕrim* (subs.) inauguration, any solemnity or customary observance at the beginning of any work.
آريمچيك	*ürimchik* (subs.) cheese.
آز	*üz* or *iz* (adj.) foot-mark, track.
آز	*áz* (adj. and adv.) little, small ; not much.

آزاده *ázáda* (adj.) neatly clothed, natty, careful of one's appearance, P.

آزار بیرماك *ázár bir-mak* (comp. v.) to scold, abuse, rebuke, upbraid, P.T.

آزاق *ázáq* (adj. *used also* subs.) low, a low place, lower.

آزایتماق *áz-aï't-máq* (v. caus.) to cause to diminish.

آزایماق *áz-áï-máq* (v. intr.) to diminish, to become less.

ازداماك *izda-mak* (v. tr.) to search for, (from *iz*).

ازدورماك *az-dur-mak* (v. tr. caus.) to cause to break (tr.), to make some one break or tear.

ازدورماق *az-dur-mák* (v. t. caus.) to cause to lose the way.

آز راق *áz-ráq* (adj. and adv.) smaller, fewer ; less.

آزغاق *áz-gháq* (subs.) a person who often loses his way.

آزغال *áz-ghál* (subs.) an erratic water-cut, a deep channel cut by a torrent or inundation (when the water has left its usual bed).

آزغان *áz-ghan* (subs.) a thorn-bush or tree.

آزغنه *áz-ghana* (adj. and adv.) tiny, little.

آزغورماق *az-ghu'r-máq* (v. tr.) to cause to lose the way.

آزغوشماق *az-ghu'sh-máq* (v. coll.) to lose the way in company.

آزغون *az-ghun* (subs.) some influence which causes men to lose their way (a local superstition in the Takla-makán desert).

ازلده *azal-da* (adv.) from eternity, A. T.

ازما *ázma* (subs.) [see *ázghal*].

ازماق *az-máq* (v.) to lose the way.

آزماللاماق *ázmal-la-máq* (v. tr.) to desire, wish for.

آزو *ázu* (subs.) a back tooth, grinder, tush, KAZ.

آزوغ *ázugh* (subs.) ditto.

آزوق *ázuq* (subs.) ditto.

آزوق *ázuq* (subs.) daily food.

آزیقتورماق *áziq-tur-máq* (v. caus.) to cause to lose the way.

آزیقشماق *áziq-ish·máq* (v. coll.) to lose the way in company.

آزیکماق *áziq-máq* (v.) to lose the way.

آسانراق *ásán-ráq* (adj.) easier, P. T.

آسانلیق *ásán-liq* (subs.) easiness, ease, P. T.

آستا	*ásta* [for *ahista*, A.] (adv.) slowly, quietly.
اُستا	*ustá* [for *ustád*, A.] (subs.) a master workman.
آستاراق	*ásta-ráq* (adv.) more slowly, P. T.
آستانه	*ástána* (subs.) a grand tomb of some celebrated person, (*lit.* threshold, P.)
آستین	*ástin* (adj.) low.
آستین ده	*ástin-da* (post-pos.) below, beneath.
اُستین	*üstin* (adj.) high, superposed.
اُستین ده	*üstin-da* (post-pos.) above, upon.
آسراتماق	*ásra't-màq* (v. caus.) to cause to take care of, attend to.
آسرالماق	*ásra'l-máq* (v. pass.) to be taken care of, attended to.
آسراماق	*ásra-máq* (v. tr.) to take care of, attend to.
آسماق	*ás-máq* (v. tr.) to hang, to suspend.
اُسماك	*üs-mak* (v. tr.) to strike with the horns, to butt.
اُسوشماك	*üs-üsh-mak* (v. recip.) to butt at one another (as the Chinese lower orders are said to do in fighting), to strike one another with the horns (of animals).
اسّیغ	*issigh* (adj.) hot, warm.
اسّیق	*issiq*
آش	*ásh* (subs.) food, [generally pilao]. Also the liquid in which skins are soaked. P.
آشا	*áshá* (adj.) more, exceeding.
آشاتماق	*ásha-t-máq* (v. caus.) to cause to eat, to feed.
آشاراق	*ásha-ráq* (adj.) [comparative of *áshá*] more.
آشاماق	*ásha-máq* (v.) to eat, to take a meal, KAZ.
آشپاز	*ásh-paz* (subs.) a cook, P.
اُشتا	*üshta* (adj.) bleached, washed white.
اُشتاچی	*üshta-chi* (subs.) a bleacher.
اُشتان	*üshtán* (subs.) wide trousers, drawers.
آشداش	*ásh-dásh* (subs.) a meal-fellow, one who eats from the same dish.
آشسیز	*ásh-siz* (adj.) without food, destitute.
اُشقار	*üshqar* (subs.) potash.
اشکاغه	*Ishk-àgha* (subs.) Lord of the Gate (a title) (see ایشک).

آشلاتماق	*ásh-la-t-maq* (v. caus.) to cause to tan (leather), to have tanned.
اشلاتماک	*ish-la-t-mak* (v. caus.) to cause to work.
آشلاماق	*ásh-la-máq* (v. tr.) to tan leather.
آشلاماک	*ish-la-mak* (v. tr.) to work, labour, do.
آشلیق	*ásh-liq* (subs.) food, provisions.
آشماق	*áshmáq*, 1. (v. tr.) to cross, surmount (a pass) ; 2. (v. intr.) to remain over *or* exceed.
آشورماق	*ásh-ur-máq* (v. caus.) 1. to cause to cross, or surmount ; 2. to cause to remain over *or* exceed.
آشوغراق	*áshugh-raq* (adj.) more, more excessive.
آشوق	*áshuq* (subs.) sheep's knuckle bones (for playing with).
آشوق	*áshuq* (adj.) much, excessive.
آشوقتورماق	*áshuq-tur-máq* (v. caus.) to cause to do quickly, to cause to make haste.
آشوقماق	*áshuq-máq* (v. intr.) to make haste, KH. KAZ.
آشیق	*áshiq* (adj.) much [same as *ashuq*.]
آشیقماق	*áshiq-máq* [same as *ashuq-maq*.]
آط	see آت
آغا	*ágha* (subs.) elder brother, KAZ.
اغاچ	*ághách* (subs.) wood, KAZ.
آغاچا	*ágha-cha* (subs.) woman, wife.
آغدارماق	*ágh-dar-màq* (v. caus.) to cause to fall, to upset, (spec.) to pull one off a horse.
آغداروشماق	*ágh-dar-ush-máq* (v. recip.) to cause one another to fall.
آغدارولماق	*ágh-dar-ul-máq* (v. caus. pass.) to be caused to fall, (or simply) to fall.
آرشماق	*âgh-dar-ish-máq* (same as *ágh-dar-ush-máq*).
اغداریلماق	*ágh-dar-il-máq* (same as *ágh-dar-ul-máq*).
اغرامچی	*aghramchi* for ارغمچی (subs.) a rope.
آغریتماق	*ághri-t-máq* (v. caus.) to cause to suffer grief or pain, to grieve (tr.)

آغریغ	*àghrigh* (adj.) ill, suffering.
آغریق	*ághriq* (the same as the last).
آغریقچان	*ághriq-chan* (subs.) a person who is always ill, an invalid.
آغریماق	*ághri-màq* (v. intr.) to be ill or suffering, to be in grief.
آغز	*ághz* (subs.) mouth.
آغماق	*ágh-máq* (v. intr.) to fall on one side (as a horse-load), to [subside, to faint.
اغو	*aghu* (subs.) a spur or projection of the mountain side over which the road has to rise in order to cross it.
آغور	*ághur* (subs.) a stallion, an entire horse.
آغور	*ághur* (adj.) heavy, large, valuable, important.
آغیر	*ághir* (adj.) [same as last.]
آغیل	*ághil* (subs.) a cattle shed, enclosure for cattle.
آغیناتماق	*ágh-in-a't-maq* (v. refl. caus.) to cause to roll.
آغیناماق	*àgh-in-a-máq* (v. refl.) to roll one's self, turn over, roll (as a horse) [Qu. from *ághmák* with the sense of "to fall [on oneself."]
آق	*áq* (adj.) white.
آقارتماق	*àq-ar-'t-máq* (v. caus.) to cause to be white, to make white.
آقارماق	*áq-ar-máq* (v. intr.) to be white, to become white.
آقباش	*áq-bash* (adj.) white headed.
اقتا	*áqta* (adj.) castrated.
آقتارتماق	*áqtar-'t-màq* (v. caus.) to cause to search.
آقتار ماق	*áqtar-màq* (v. tr.) to search.
آقتاش	*Aq-tásh* (Prop. name) White-stone.
آقتاغ	*àq-tágh* (comp. subs.) *lit.* white mountain, *i. e.* snowy-range (as distinguished from mountain ridges on which the snow is not perpetual and which are called *Qára-tágh*). Locally this word is often used as a proper name applied to the particular snow mountains of the neighbourhood; but its use in general geography should be supplemented, as in native use, by prefixing the name of the locality, as in English we say: the Brighton Downs, the Wiltshire Downs, &c. The neglect of this causes much confusion, and false geography. There is also a place called *Aq-tàgh* from the colour of its rocks.

آقتماق - آقیزماق	*áq-it-máq* or *àq-iz-màq* (v. caus.) to cause to flow, to pour.
آقتورماق	*áq-tur-máq* (v. caus.) [the same as last].
اُقتورماق	*uq-tur-maq* (v. caus.) to cause to understand, to instruct.
آقساق	*àqsàq* (adj.) lame.
اُقماق	*uq-maq* (v. intr.) to understand.
آقماق	*áq-maq* (v. intr.) to flow.
اکاه	*aka* (subs.) elder brother.
اگري - اگرو	*agrü, agri* (adj.) crooked, evil-disposed.
آل	*ál* (adj.) pale red, pink.
آلا	*ála* (adj.) variegated, spotted.
آلابولا	*ála-bula* (adj.) of intermixed colours.
آلاچ	*Alàch* (Prop. name) a comprehensive name given to the tribes of Kazzaks and Kirghiz, from some eponymous ancestor.
آلاچا	*ála-cha* (subs.) a kind of striped cotton cloth.
آلارماق	*álar-màq* (v. tr.) to look with anger upon, to change countenance with anger.
آلاشاقشاق	*ala-shàq-shàq* (subs.) magpie.
آلاقان	*álaqan* (subs.) the hollow of the hand.
آلامان	*álamán* (subs.) a robber, bandit.
آلانگگان	*alanggan* (subs.) a word used with repetition *alanggan shalanggan,* to express a confused mass of things.
آلاي	*Alaï* (Prop. name) a high plateau north of the Pamir steppes.
آلبان	*álbán* (subs.) land-tax.
آلبانچي	*álbán-chi* (subs.) one who pays land-tax.
البستي	*albasti* (subs.) a night-mare, an incubus.
آلتاو	*áltao* (num. subs.) all six, the whole six.
آلتاي	*Altaï* (Pr. n.) a mountain range south of Siberia; *also* the fox-skins brought thence.
آلتايلان	*áltaï-lan* (num. subs.) the whole six.
آلتميش	*ált-mish* (num.) sixty.
آلتون	*áltun* (subs.) gold.
آلتونچي	*áltun-chi* (subs.) gold-smith.

آلتين	*áltin* (adj.) low ; *áltin-da* (post-pos.) below [gov. gen.]
آلتينچي	*alti-'n-chi* (num.) sixth.
آلجوشماق	*álju-'sh-maq* (v. rec.) to twaddle to one another, use empty talk together.
آلجوماق	*álju-máq* (v. intr.) to twaddle, gossip.
الچين	*alchín* (subs.) a measure of length of about 28 inches (Russian *arschine).*
آلداتماق	*álda-'t-máq* (v. caus.) to cause to deceive.
آلداشماق	*álda-'sh-màq* (v. rec.) to deceive one another.
آلداماق	*álda-maq* (v. tr.) to deceive, play off.
آلدانماق	*álda-'n-màq* (v. pass.) to be deceived, &c.
آلدى	*áldí (? àld)* (subs.) front, presence.
آلديده	*áldi-da* (post-pos. gov. gen.) in front of, in presence of.
آلديراتماق	*áldera-'t-màq* (v. caus.) to cause to do quickly, to hasten, to hurry (tr.)
آلديراش	*álderash* (adj.) quick, hurried (applied to the work not to the agent).
آلديراشتورماق	*áldera-'sh-tur-máq* (v. coll. caus.) to cause to make haste in company.
آلديراشماق	*áldera-'sh-máq* (v. coll.) to make haste, or be busy in company.
آلديراماق	*áldera-maq* (v. intr.) to make haste, be busy.
القا	*alqa* (subs.) ear-ring, ear-ornament, KAZ. from A.
آلقات	*álqat* (subs.) a small wild plum.
آلقاش	*álqash* (subs.) the act of blessing, or praying for the welfare of another.
آلقاشماق	*álqa-'sh-màq* (v. rec.) to invoke blessing on one another, to invoke blessings together.
آلقاماق	*álqa-màq* (v. tr.) to bless, invoke blessings on.
القيش	*álqish* [same as *álqash*].
آلما	*álma* (subs.) apple.
آلماتي	*Almati* (Prop. name) a place north of Issiqkül, the site of the Russian cantonment of Vierny (called *Almati* from its groves of apple-trees).

آلماق	*álmáq* (v. tr.) to take ; *also* to overcome in any contest. Much used in composition : e. g. *àlip-kelmak* "to bring", *àlip-kirmak* "to take into", *àlip-bàrmàq* "to take away" &c.
آلماليق	*Alma-liq* (Prop. name) the name of several places in Central Asia.
آلوان	*alwán* (subs.) "Turkey-red," the cotton stuff dyed that colour and so called. (*? from* A.)
آلو بالو	*álu-bálu* (subs.) plum.
آلو بخار	*álu-bokhár* (subs.) plum.
آلوچه	*àlu-cha* (subs.) a small plum.
اُلوغ	*ulúgh* (adj.) great, large, grand, venerable (referring to moral qualities or position chiefly), *also* elder.
اُلوغلاشماق	*ulúgh-la-'sh-máq* (v. recip.) to exalt one another.
اُلوغلاماق	*ulúgh-la-máq* (v. tr.) to make great, to exalt.
اُلوغليق	*ulúgh-liq* (subs.) greatness, dignity.
آليش	*álish* (v. subs.) a taking ; *spec.* the head of a canal or derivatory water-course, where the water is *taken* out of the main stream.
آليشماق	*ál-ish-máq* (v. recip.) to mix (with the hands), (lit. to take together).
آلينماق	*ál-in-máq* (v. pass.) to be taken.
آلينيلماق	*ál-in-il-máq* (a redoubled passive) to be taken.
آماچ	*ámách* (subs.) a plough.
آموت	*ámut* (subs.) a large kind of pear, P.
آموروت	*ámurut* (subs.) *the same*, P.
انا	*ana* (interject.) here, this, look here !
آنا	*ána* (subs.) mother.
اُناک	*ünak* (subs.) a milch-cow.
آنت	*ánt* (subs.) oath, engagement, vow ; *ánt ichmak* = to drink an oath, *i. e.*, to swear.
انجي	*anji* (subs.) a stack.
آنچه	*án-cha* (pron.) that much [from *an*, oblique of *ul*, which see].
انچه	*'ncha* (term.)—fold ; e. g. *yüz-ancha* "a hundred-fold."

آندا *án-da* (adv.) lit. in that ; *but specially :* in that place, there.

آنداغ *án-dágh* (pron. and adv.) like that, such ; *also* like that, so.

آنداغراق *án-dágh-ráq* (pron. and adv.) more like that.

انداق *án-dáq* [same as *án-dágh*].

آنداقچه *án-dáq-cha* (pron. and adv.) lit. to an amount similar to that, such like, so much.

آنداین *án-dáin* [same as *ándàq*] KH.

آندین *àn-din* (adv.) lit. from that ; *but specially :* from that place, thence.

آنگ *àng* (obsol. subs.) understanding [only used in composition.

آنگا *àn-ga* [prd. *anga*] (pron.) to him, her *or* it [*an,* the oblique form of *ul*].

آنگاچه *àn-ga-cha* (adv.) to that amount, up to that time.

آنگسیز *àng-siz* (adj. and adv.) without understanding ; *also* suddenly, without premeditation.

آنگلاتماق *áng-la-'t-máq* (v. caus.) to cause to understand, to instruct.

آنگلاشماق *áng-la-'sh-máq* (v. recip.) to understand one another.

آنگلاماق *áng-la-máq* (v. tr.) to understand, to be aware.

آنگلانماق *àng-la'n-màq* (v. pass.) to be understood *or* known, (refl.) to make itself known (of news &c.), to come to one's knowledge.

اُو *u* [for *ul*] (pron.) that, he, she, it.

آو *áu* (subs.) sport, hunting, shooting, *also* game [? from Persian *áhu*].

آوا *áwa* (int.) yes, well, all right.

اُوّا - اُووا *ŭwwa* (subs.) bird's-nest.

اُوات *ŭwát* (subs.) shame, modesty.

اُواتماق *ŭwát-máq* (v. intr.) to feel shame or modesty.

اُواتماق *ŭwá-t-máq* (v. tr.) to quiet a child.

اُواق *ŭwáq* (subs.) crumbs, débris, (from *uwa-màq*).

آوالاشماق *áwa-la-'sh-máq* (v. recip.) to agree together, to consent together, to combine [from *áwa*].

اُوالاشماق *ŭwa-la-'sh-màq* (v. recip.) to build nests in company (as swallows or rooks).

آوالاماق	*ŭwa-la-màq* (v.) 1. to build nests ; 2. to rub, to wring.
آوالماق	*ŭwa-'l-máq* (v. pass.) to be crumbled, to fall into débris.
اواماق	*ŭwa-máq* (v. tr.) to crumble or break-up.
اوانماق	*ŭwa'n-máq* (v. intr.) to be quietly occupied (of a child).
آوب	*ub*, an exclamation used in lifting weights.
اوبا	*uba* (subs.) a pestilence, epidemic, *from* A. *waba.*
اوبدان	*obdán* (adj.) good.
اوپا	*upa* (subs.) a white powder used by women to improve their complexions.
اوپتورماک	*öp-tur-mak* (v. caus.) to cause to kiss [used of the person who submits to the operation].
اوپچین	*öpchin* (subs.) a set of four horse-shoes with the nails.
اوپراتماق	*öpra-t-máq* (v. caus.) to cause to crumble to pieces, to break up, crumble (tr.).
اوپراماق	*öpra-màq* (v. intr.) to crumble, to fall to dust ; to grow old.
اوپروق	*öpruq* (adj.) crumbled, ruinous (from preceding).
اوپرولماق	*öpru-'l-máq* (v. pass.) to be crumbled [also *öpra-'l-máq*].
اوپکا	*öpka* (subs.) lungs ; wrath, anger, offence.
اوپکا قاقماق	*öpka-qàqmáq* (v. tr.) to beat one's shoulders and back with the fresh lungs of an animal. A Turki custom supposed to be a remedy in illness.
اوپکالاتماک	*öpka-la-'t-mak* (v. caus.) to cause one to be offended, to offend.
اوپکالاشماک	*öpka-la-'sh-mak* (v. recip.) to be offended with one another.
اوپکالاماک	*öpka-la-mak* (v. intr.) to be offended, to take offence.
اوپماک	*öp-mak* (v. tr.) to kiss, to embrace.
اوپوپ	*upup* (subs.) a kind of bird with a crest, a hoopoo (?).
اوپوچ	*öpüch* (subs.) a kiss.
اوپوشماک	*öp-üsh-mak* (v. recip.) to kiss one another.
اوت	*üt* (subs.) gall.
اوت - ارط	*ot* (subs.) fire.
اوت	*ot* (subs.) grass.
آوت	*uwüt* (subs.) malt, sprouting grain used for making a sort of beer, KAZ.
اوتاتماق	*ota-'t-màq* (v. caus.) to cause to pluck out weeds (see *otá-máq*).

اوتاشماق	*otá-'sh-máq* (v. recip.) to pluck weeds in company.
اوتاغ	*otágh* (subs.) a temporary abode, a Kirghiz tent.
اوتاغات اوتاغه	*otághat* (subs.) a plume, a crest of peacock's feather worn by high dignitaries under the Chinese.
اوتاق	*otáq* (same as *otagh*).
اوتاک	*ütak* (subs.) knee-boots worn in Turkistán.
اوتاکچي	*ütak-chi* (subs.) a bootmaker.
اوتاماق	*otá-máq* (v. tr.) to pluck up weeds or grass.
اوتاماک	*üta-mak* (v. tr.) to read *or* say prayers, to recite.
اوتاو	*otáo* (same as *otágh*) KH.
اوترا	*otra* (subs. & adj.) the midst; middle, intermediate; [*otra-si-da* = in the midst of it]? for *urta*.
اوترانچي	*otrá-n-chi* (subs. &. adj.) the middle one; middle, intermediate.
اوترو	*ütrü* (adv.) opposite, facing (? from *üt-mak* "to meet").
اوتروک	*ütrük* (subs.) lie, untruth, KAZ. (? for *durogh*, P.).
اوتروکچي	*ütrük-chi* (subs.) liar, KAZ.
اوتقاچ	*ot-qàch* (subs.) dry shavings &c. for lighting a fire. In the bazàrs of Yarkand and Kàshghar these are sold in the form of short logs of wood 3 or 4 inches thick, and so accurately sliced to the thickness of stout paper, that when all the slices are put together and tied in the form of the original log, no separation can be detected at first sight. This is done with a special tool. The ends are dipped in sulphur before sale, so that they can be used for raising a flame from the embers of overnight.
اوتقازماق	*ut-qàz-máq* (v. caus.) [same as following].
اوتقوزماق	*ut-quz-máq* (v. caus.) to cause to sit.
اوتکارماک	*üt-kar-mak* (v. caus.) to cause to pass over *or* through, to recite.
اوتکازماک	*üt-kaz-mak* (v. caus.) [the same as the last].
اوتکور	*ütkür* (adj.) sharp, (viz. 'which passes through').
اوتکورماک	*üt-kür-mak* (v. tr. and caus.) to sharpen, [also same as *üt-kar-mak*].
اوتکوزماک	*üt-küz-mak* (v. tr. and caus.) do. do.
اوتلاق	*ot-làq* (subs.) a grassy place, a meadow, a pasture.

آوتماک	*áwu-'t-mak* (v. caus.) to cause to increase.
اوتماک	*üt-mak* (v. tr.) to pass, to go over *or* through, to penetrate, to cross, to meet. *Metaph.* to go through *or* accomplish any work; to pass over *or* forgive a fault, &c.
اوتنا	*ütna* (subs.) a temporary loan of any thing.
اوتني	*ütni* (subs.) [the same].
اوتور	*utur* (adj.) straight.
اوتورلاماق	*utur-la-máq* (v. tr.) to make straight.
اوتورماق	*utur-màq* (v. intr.) to sit.
اوتوک	*ütük* (subs.) high riding boots, Kh.
اوتون	*ütün* (subs.) pardon obtained by some-one's intercession (from *üt-mak*).
اوتون	*otun* (subs.) fuel, fire-wood. (From *ot* "fire").
آوّچ	*úwuch* (subs.) a handful.
اوچ	*öch* (num.) three.
اوچ	*uch* (subs.) a feud, a state of enmity.
اوچ	*uch* (subs.) an end, a point.
اوچا	*ucha* (subs.) the posteriors, the back.
اوچارقوش	*öchár-qush* (compound subs.) a flying bird [from *öch-màq* = to fly, and *qush* = a bird].
اوچارليق	*öchàr-liq* (subs. and adj.) a creature that flies; *also* flying, possessed of the power of flight.
اوچاش	*uchash* (adj.) at feud, inimical.
اوچاشماک	*ucha'-sh-mak* (v. recip.) to be at feud with one another [from an un-used verb *ucha-mak*].
اوچاغ	*uchágh* (subs.) a fire-place, cooking-place.
اوچاق	*ucháq* (subs.) [the same].
اوچاک	*üchak* (subs.) entrails, Kh.
اوچاو	*öch-ao* (num. subs.) all three, the three.
اوچاولان	*öch-áo-lan* (num. subs.) all three.
اوچاي	*üchaï* (subs.) entrails.
اوچايلان	*öch-aï-lan* (num. subs.) all the three.
اوچراتماق	*öchra-'t-máq* (v. caus.) to cause to meet.
اوچراشماق	*öchra-'sh-máq* (v. recip.) to meet one another.
اوچراماق	*öchra-máq* (v. intr.) to meet, to encounter on the road [governs *ga*].

اوچقاق *öch-qáq* (adj.) flying about much [from *öch-máq*].

اوچقون *uch-qun* (subs.) a spark.

اوچکاک *uch-kak* (adj.) burning badly, becoming extinguished rapidly (of fire-wood, or fire) [from *uch-mak*].

اوچکو *üchkü* (subs.) a goat.

آوّچلاشماق *úwuch-la-'sh-máq* (v. recip.) to take by handsful together [from next].

آوّچلاماق *úwuch-la-máq* (v. tr.) to take by handsful [from *úwuch*].

اوجما *üjma* (subs.) mulberry.

اوجماق *ujmáq* (subs.) Heaven, the abode of the blessed.

اوچماق *öch-màq* (v. intr.) to fly.

اوچماک *uch-mak* (v. intr.) to become extinguished, to go out (as fire).

اوچور *öchör* (subs.) news, intelligence, answer.

اوچورماق *öch-ör-máq* (v. caus.) to cause to fly.

اوچورماک *uch-ur-mak* (v. caus.) to cause to become extinguished, to extinguish, to put out.

اوچوشماق *öch-ösh-máq* (v. recip.) to fly together.

اوچوق *uchuq* (adj.) open [same as *àchiq*].

اوچولاسی *öch-ö-la-si* (num. subs.) all the three of them.

اوچولانچی *öch-ö-lan-chi* (num. subs.) third, KH.

اوچون *uchun* (post-pos.) because of, for, on account of [governs the genitive].

اوچونچی *öch-ön-chi* (num. adj.) third.

اوخ *ukh* (interj.) an exclamation of pain or fatigue, (Cf. German "ach").

اوخراشماق *ukh-ra-'sh-máq* (v. recip.) to snort together [of horses].

اوخراماق *ukh-ra-máq* (v. intr.) to snort.

اوخشاتماق *okhsha-'t-máq* (v. caus.) to make like, to equalize; *also*, to compare.

اوخشاش *okhshash* (adj.) like, equal to.

اوخشاشماق *okhsha-'sh-máq* (v. recip.) to be alike, to resemble one another,

اوخشاماق *okhsha-máq* (v. intr.) to be like, to resemble; to be probable, to be likely; to be fulfilled (a promise).

اوخشوماق *ukhshu-máq* (v. intr.) to retch, vomit.

اوخلاتماق	*ukh-la-'t-máq* (v. caus.) to cause to sleep.
اوخلاشماق	*ukh-la-'sh-máq* (v. coll.) to go to sleep together.
اوخلاماق	*ukh-la-máq* (v. intr.) to sleep, to go to sleep.
اوخور	*ökhör* (subs.) a manager (for horses). *From* P.
اوخوراماق	*ökhör-a-máq* (v. intr.) to sneeze (of a horse).
آورا	*úra* (adj.) standing upright.
اورا	*ura* (subs.) a hole in the ground for storing grain, a garner, a caché.
اورادان	*öradan* (subs.) a colouring matter, madder.
اوراغ	*örágh* (subs.) a covering, the cloth bound round a package.
اوراق	*öráq* (subs.) a sickle, KH. KAZ.
اوراقچي	*öráq-chi* (subs.) a reaper, KH. KAZ.
اورالاش	*úra-lash* (adv.) upwards, up-hill.
اوراماق	*öra-máq* (v. tr.) to wind, wrap.
اوراو	*örau* (subs.) a cloth wound round anything (the same as *öragh*], KAZ.
اورتا	*urta* (subs. and adj.) middle ; *urta-da* (adv.) in the middle.
اورتاق	*urtàq* (subs.) partner ; *also* friend, intimate.
اورتاقلاماق	*urtàq-la-máq* (v. intr.) to be in partnership.
اورتاماک	*urta-mak* (v. tr.) to set on fire, to burn (chiefly the dry grass of a hill-side).
اورتانماک	*urta-'n-mak* (v. refl.) to burn itself, to burn (intr.), to be [enflamed.
اورتانگ	*úrtang* (subs.) a staging post, a traveller's rest-house, a stage (? from *urta*, qu. half-way-house).
اورتانگچي	*úrtang-chi* (subs.) a man in charge of a staging post, a post-master *or* post-rider.
اوردا	*úrda* (subs.) a Royal residence, a Court, a Royal place of [audience.
اورداک	*ördak* (subs.) a duck [wild or tame].
اوردورماق	*úr-dur-máq* (v. caus.) to cause to strike.
اوردورماک	*ör-dör-mak* (v. caus.) to cause to braid the hair.
اورغاچي	*urgha-chi* (subs.) a female (of man or beast), KAZ.
اورغاق	*urgháq* (subs.) a sickle.
اورگاتماک	*örgà-'t-mak* (v. caus.) to cause to learn, *i. e.* to teach.
اورکاچ	*örkach* (subs.) a camel's hump.

اورگانشماک	*örgà-'n-ish-mak* (v. recip.) to learn together.
اورگانماک	*örgá-'n-mak* (v. refl.) to instruct oneself, *i. e.* to learn.
اورگوت	*örgöt* (subs.) winnowed grain prepared for the mill.
اورلاتماک	*ör-la-'t-mak* (v. caus.) to cause to climb.
اورلاماک	*ör-la-mak* (v. intr.) to climb; to rise, to mount up.
اورلانماک	*ör-la-'n-mak* (v. refl.) to climb, (cf. "*se* cramponner.")
اورماق	*úr-máq* (v. tr.) to strike, to beat.
اورماق	*ur-máq* (v. tr.) to reap, to cut grass.
اورما لث	*ör-mak* (v. tr.) to braid the hair.
اورماک	*örmak* (subs.) a rough loom without treadles for weaving coarse carpets, &c.
آوّرماک	*uwur-mak* (v. tr.) to turn over, to reverse. *Yüz uwurmak* = to turn the face, to face round.
اورمالاشماک	*ürma-la-'sh-mak* (v. recip.) to crawl together.
اورمالاماک	*ürma-la-mak* (v. intr.) to crawl, to creep.
اررناشتورماق	*urna-'sh-tur-máq* (v. recip. caus.) to appoint to each his place, to settle each in place.
اورناشماق	*urna-'sh-máq* (v. recip.) to be each in his own place, to be respectively settled.
اورناماق	*urna-máq* (v. intr.) to be settled, fixed, (from *urun*).
اوروشتورماق	*ur-ush-tur-máq* (v. caus.) to cause to fight.
اوروشقاق	*ur-ush-qáq* (adj.) given to fighting, quarrelsome.
اوروشماق	*ur-ush-máq* (v. recip.) *lit.* to strike *or* beat one-another, *i. e.* to fight.
اوروشماک	*ör-ösh-mak* (v. recip.) to braid one-another's hair.
اوروغ	*urugh* (subs.) seed; *also* offspring, family, clan.
اوروغ توققان	*urugh tuqqàn* (subs.) relations, family.
اوروغلاتماق	*urugh-la-'t-máq* (v. caus.) to cause to get thin, &c. (see *urugh-la-màq*).
اوروغلاشماق	*urugh-la-'sh-máq* (v. recip.) to make one-another thin, to get thin together [see next word].
اوروغلاماق	*urugh-la-máq* (v.) 1. to get thin; 2. to sow seed; 3. to muster strong in family, to swarm.
اورق	see *urugh*; *üruq* (adj.) thin, in bad condition.

اوروقلاماق *uruq-la-máq* [the same as *urugh-la-máq*].

اوروك *uruk* (subs.) apricot.

اورولماق *ur-ul-máq* (v. pass.) to be struck, to be beaten.

اورولماك *ör-öl-mak* (v. pass.) to be braided [of hair.]

اورولماک *uwur-ul-mak* (v. pass.) to be turned, reversed, upset.

اورون *urun* (subs.) place, station.

اورونماق *ur-un-máq* (v. refl.) to strike one's self against (in passing).

اورونوشماق *ur-un-ush-máq* (v. refl. recip.) to strike against one another [in passing.

اوز *öz* (pron.) self.

اوز *uz* (adj.) handsome, pretty, beautiful.

اوزا *uza* (subs.) surface, top ; *uza-si-da* = on the top of it.

اوزاتماق *uza-'t-máq* (v. caus.) *lit.* to cause to go far *(éloigner)* ; to reach out a thing ; to go out to meet, *or* to escort, a guest.

اوزاماق *uza-máq* (v. intr.) to go far.

اوزاق *uzáq* (adv.) far, *(éloigné)*.

اوزلاماك *uz-la-mak* (v. tr.) to top, *or* take the top off any thing, to skim [from *uza*].

اوزانگو *uzangu* (subs.) a stirrup.

اوزبك *Öz-bak* (Pro. name) a certain tribe of Turki race, the ruling tribe in Bokhára and Khiva.

اوزدورماق *öz-dur-máq* (v. caus.) to cause to go a-head, to cause to outrun.

اوزدورماک *üz-dür-mak* (v. caus.) to cause to break by pulling, to cause to pull in pieces.

اوزگا *öz-ga* (adj.) *lit.* to itself ; *i. e.* separate, different.

اوزگاچه *öz-ga-cha* (adv.) in a separate *or* different manner, otherwise, changed (in a bad sense) [e. g. *ish özgacha boldi* "affairs have gone to grief"].

اوزگارتماك *özga-r-'t-mak* (v. caus.) to cause to change colour [from *öz-ga-r-mak*].

اوزگارشماك *özga-r-'sh-mak* (v. recip.) to change colour together.

اوزگارماک *özga-r-mak* (v. intr.) to become different (of colour) ; to change colour, to become discoloured.

اوزلوك *öz-lök* (adv.) by one's self *or* selves ; (subst.) self-ness *i. e.* [consciousness.

اوزليک	*öz-lik* [the same as the last].
اوزماق	*öz-máq* (v. intr.) to out-run, to get foremost in a race.
اوزماك	*üz-mak* (v. tr.) to break off by pulling, to pull in pieces, to [tear away.
اوزوق	*uzuq* (subs.) food, provisions.
اوزوك	*özök* (subs.) a finger-ring.
اوزوک	*üz-ük* (subs.) a piece broken off, a fragment [from *üz-mak*]; (adj.) fragile, slender.
اوزولماك	*üz-ül-mak* (v. pass.) to be broken by pulling, to be torn away [from *üz-mak*].
اوزوم	*üzüm* (subs.) a grape.
اوزوم	*öz-öm* (pron.) I myself; *öz-ömiz* = we ourselves.
اوزون	*uzun* (adj.) long, tall.
اوزنگ	*öz-öng* (pron.) thou thy-self; *öz-öngiz* = ye yourselves.
اوزي	*öz-i* (pron.) he himself, &c.
اوزيچه	*öz-i-cha* (adv.) of one's self, by one's self.
اوسّاق	*ussáq* (adj.) thirsty.
اوسال	*usal* (adj.) bad, evil, KH. KAZ.
اوسال لاماق	*usal-la-máq* (v. intr.) to become bad, to go to the bad.
اوسّاماق	*ussa-máq* (v. intr.) to be thirsty, to thirst.
اوستا	*ustá* (subs.) a teacher; an artisan, *from* P.
اوستارا	*ustara* (subs.) a razor, P.
اوستانگ	*ustang* (subs.) a canalized stream, a trunk canal.
آوستورماك	*us-tur-mak* (v. caus.) to cause to become large, to cause to increase, to increase (tr.).
اوستون	*üstün* (subs.) pillar, column [for P. "*situn*"].
اوستون	*üstün* (adj. adv.) upper; above; *üstün-da* upon, (obl. possessed form of following word: for *üst-in* = "the top of it").
اوستي	*üst-i* (subs. poss.) its top; *üst-i-da* = on its top.
اوسما	*usma* (subs.) a black dye for the hair, P.
اوسماق	*us-máq* (v. tr.) to fill up grain, &c. into a sack, to shovel *or* scoop anything into a bag.
اوسماك	*üs-mak* (v. tr.) to butt, to strike with the horns.
اوسماک	*us-mak* (v. intr.) to increase, to grow, to get big.

اوشا *u-sha* (pron.) that [contr. from *u-shal*].

اوشاتماق *usha-'t-máq* (v. tr.) to break in pieces, to break up.

اوشاق *ushàq* (adj.) little; (subs.) bits, débris, powder; *also* a menial servant.

اوشال *u-shal* (pron.) that [from *ul* and *shul*].

اوشالماق *usha-'l-máq* (v. pass.) to be broken up.

اوشانچه *u-shan-cha* (pron. and adv.) to that amount; [*shul* becoming *shan* in the oblique cases].

اوشاندا *u-shan-da* (adv.) *lit.* in that very [place]; there.

اوشانداق *u-shan-dáq* (pron. and adv.) like that, so.

اوشبو *ush-bu* (pron.) this, this very [from *shu* and *bu*].

اوشنگا *u-shan-ga* (pron.) to that very (place), thither.

اوشني *öshni* (subs.) shoulder.

اوشورماق *ush-ur-màq* (v. caus.) to cause to exceed, to magnify, to increase, (see *àshur-màq*).

اوشوق *ushuq* (subs.) sheep's knuckle-bones used for playing.

اوشوق *ushuq* (adj.) much, very much.

اوشوقماق *ushuq-màq* (v. intr.) to agitate oneself, to hasten (see *àshuq-màq*).

اوشوك *ushuk* (subs.) frost, cold [as it affects vegetation].

اوغراماق *ughra-màq* (v. tr.) to encounter.

اوغرلاتماق *ughar-la-'t-máq* (v. caus.) to cause to steal *or* rob.

اوغرلاشماق *ughar-la-'sh-máq* (v. recip.) to rob one another.

اوغرلاماق *ughar-la-máq* (v. tr.) to thieve, to rob.

اوغري *ughri* (subs.) thief.

اوغل see اوغول

اوغلاق *ughláq* (subs.) a kid, *also* a game on horse-back played with the body of a kid.

اوغلان *ughlan* (subs.) a male child, a boy.

او غوچ *ughuch* (subs.) a rolling-pin for pastry.

اوغوت *ughut* (subs.) malt.

اوغور *ughur* (subs.) a mortar in which grain is pounded.

اوغوز *ughuz* (subs.) milk of the cow during a day or two after the birth of the calf, (not drinkable).

اوغول *ughul* (subs.) a male child, son, boy. [*màq*].

اوفراتماق *ufra-'t-máq* (v. caus.) to cause to crumble [same as *öpra-'t-*

اوفراماق *ufra-máq* (v. intr.) to crumble, [same as *öpra-màq*].

اوفرق *ufruk* (adj.) crumbled, ruinous [*öpruq*].

اوفكا *ufka* (subs.) lungs ; anger [see *öpka*].

اوفكالاماك *ufka-la-mak* (v. intr.) to take offence [see *öpka-la-mak*].

اوفماك *uf-mak* (v. tr.) to kiss [see *öpmak*].

اوق *oq* (subs.) a projectile ; an arrow, a bullet ; *also* the pole of a cart or plough ; the beam of an oil press.

اوقا *oqa* (subs.) gold lace (real or imitation).

اوقات *auqàt* (subs.) subsistence, sustenance, maintenance [A. with a special meaning acquired]. *màq*].

اوقتورماق *uq-tur-máq* (v. caus.) to cause to understand [from *uq-*

اوقشوماق *oqshu-máq* (v. intr.) to retch, vomit.

اوقماق *uq-máq* (v. tr.) to understand, to comprehend, to take in.

اوقوتماق *oqu-'t-máq* (v. caus.) to cause to read, to instruct, to teach.

اوقوشماق *oqu-'sh-máq* (v. recip.) to read in company.

اوقولماق *oqu-'l-máq* (v. pass.) to be read.

اوقوماق *oqu-máq* (v. tr.) to read, to recite.

اوكا *uka* (subs.) a younger brother.

اوكاي *ugaï* (adj.) step- : e. g. *ugaï-bala*, a step-son or daughter.

اوكتا *uqta* (subs.) defalcations in the matter of public revenue, by which either the prince or the private payers of revenue are cheated.

اوكتام *uktam* (adj.) same, Kaz.

اوكچه *ukcha* (subs.) the kernel (in any stone-fruit).

اوكچه *ukcha* (subs.) heel. [sit.

اوگزا *ugza* (subs.) a roof, generally a flat roof on which one can

اوكسوز *uk-süz* (adj.) left an orphan, without parents, Kaz.

اوكسوماك *uksu-mak* (v. intr.) to sit aside in grief, to fret, *also* to dimi-

اوگماك *ug-mak* (v. tr.) to rub into powder, Kaz. [nish, Kaz.

اوگوت *ögöt* (subs.) winnowed grain prepared for the mill [the same as *örgöt*].

اوکورتماک	*ukur-'t-mak* (v. caus.) to cause to bellow.
اوگورتماک	*ugur-'t-mak* (v. caus.) to cause to turn (tr.), to make some-one turn something.
اوکورماک	*ukur-mak* (v. intr.) to bellow.
اوگورماک	*ugur-mak* (v. tr.) to turn over, to turn round, to turn aside.
اوکوروشماک	*ukur-ush-mak* (v. recip.) to bellow at one another, to bellow in company.
اوگوروشماک	*ugur-ush-mak* (v. recip.) to turn over together (tr).
اوکوز	*ukuz* (subs.) an ox, Kh.
اوگوز	*uguz* [the same,] Kaz.
اوگولماک	*ug-ul-mak* (v. pass.) to be crumbled.
اوکونماک	*ukun-mak* (v. intr.) to regret, to be sorry.
اوکونوچ	*ukunuch* (subs.) regret, sorrow.
اوکي	*uki* (subs.) owl.
اول	*ul* (pron.) that, he, she, it (oblique, generally *an* sometimes [*un*).
اولات	*ülat* (subs.) pestilence (on man or beast) [see *ül-mak*].
اولا	*ulâr* (subs.) a snow pheasant (*Tetraogallus tibetanus*).
اولاشتورماق	*ula-'sh-tur-máq* (v. rec. caus.) to cause to catch up a party.
اولاشتورماک	*ülash-tur-mak* (v. rec. caus.) to cause to partition, or distribute.
اولاشماق	*ula-'sh-máq* (v. recip.) to unite with others, [specially] to catch up a party,
آولاشماق	*âu-la-'sh-máq* (v. recip.) to hunt together [see *âu*].
اولاشماک	*ülash-mak* (v. tr.) to distribute, to divide, see اولوش.
اولاغ	*ulágh* (subs.) a beast of burthen, a baggage animal.
اولاغليق	*ulágh-liq* (subs.) an owner of baggage-animals, (adj.) appertaining to baggage-animals.
اولاق	*uláq* [the same as *ulâgh*].
آولاق	*àuláq* (subs. and adj.) privacy, seclusion; private, secluded.
اولاقتورماق	*ulaq-tur-máq* (v. caus.) to cause to stray, to drive away from a herd or flock, Kaz.
آولاقلاماق	*âuláq-la-máq* (v. intr.) to make private, [used of a place, not of a person].

اولاقماق	*ulâq-mâq* (v. intr.) to stray, to go astray, Kaz.
آولاماق	*âu-la-mâq* (v. tr.) to hunt, to shoot, to kill in hunting.
اولاماق	*ula-mâq* (v. tr.) to join, unite.
اولانگ	*ulang* (subs.) a horse's girth.
اولتا	*ulta* (adj.) incorrect, mistaken, wrong.
اولتان	*ultan* (subs.) the sole of a boot, Kaz.
اولتورغورماق اولتورغوزماق	*ultur-ghur-màq* *ultur-ghuz-máq* } (v. caus.) to cause to sit, to seat.
اولتورگوزماک	*ül-tür-ghüz-măk* (v. redupl. caus.) to cause to kill, *lit.* to cause to cause to die (see *ül-mak*).
اولتو رماق	*ultur-mâq* (v. intr.) to sit, to be seated.
اولتورماک	*ül-tür-mak* (v. caus.) to kill, *lit.* to cause to die.
اولجا	*ulja* (subs.) booty, plunder, loot.
اولجالاشماق	*ulja-la-'sh-máq* (v. recip.) to loot one-another.
اولجالاماق	*ulja-la-máq* (v. tr.) to plunder, to loot.
اولچاشماک	*ülcha-'sh-mak* (v. recip.) to weigh one-another.
اولچاک	*ülcha'k* (subs.) a balance, scales, any weighing instrument.
اولچاماک	*ülcha-mak* (v. tr.) to weigh.
اولغا يتماق	*ulgh-aï-'t-máq* (v. caus.) to cause to become greater, to cause to increase. [*ulugh.*
اولغيماق	*ulgh-ai-máq* (v. intr.) to become greater, to increase [from
اوّلغي	*awwal-ghi* (adj.) the first, the foremost, A. T.
اوّلقي	*awwal-qi* (the same).
اولكا	*ülka* (subs.) territory, region, district.
اولكان	*ülkan* (adj.) great, large, Kaz.
اولگورماک	*ülgür-mak* (v. intr.) to come *or* go forward, to advance (? for *ilgar'-mak*).
اوّلگي	*awwal-gi* (adj.) the first.
اولماق	(rare, probably borrowed from the West) for **بولماق**
اولماک	*ül-mak* (v. intr.) to die.
اولوس	*ulus* (subs.) a tribe, a division of a tribe (chiefly of nomads). *Almost obsolete.*
اولوش كون	*ül-üsh kön* (adv.) the day before yesterday, the other day.

اولوش *ülüsh* (subs.) a portion, a share.
اولوشماق *ülüsh-màq* (v. tr.) to separate into parties.
اولوغ *ulugh* (adj.) great, large, grand; *also* eldest, elder.
اولوغراق *ulugh-ráq* (adj.) greater.
اولوغلاماق *ulugh-la-máq* (v. tr.) to enlarge, to confer grandeur.
اولوک *ül-ük* (subs.) a dead man or beast, a corpse, a carcass.
اولوم *ül-üm* (subs.) death; (adj.) past, expired.
اوماچ *umach* (subs.) a kind of semolina made of flour and eaten with soup.
اومروتقه *umrutqa* (subs.) the back-bone, KAZ.
اون *un* (num.) ten. Also for *und*, which see.
اون *ün* (subs.) a voice, a sound.
اوناتماق *una-'t-máq* (v. caus.) to cause to agree.
اوناشماق *una-'sh-máq* (v. recip.) to agree together (in any matter).
اوناماق *una-máq* (v. tr.) to agree, to consent.
اوند *und* (subs.) flour.
اوندا *un-da* (pron. and adv.) *lit.* in that (place or time), *i. e.*, there, then.
اونداماک *ünda-mak* (v. tr.) to summon with the voice (without outcry)
اوندورماک *un-dur-mak* (v. caus.) to cause to sprout.
اونگ *ung* (adj.) right (hand); *also* right, proper.
اونگالتماق *ungal-'t-máq* (v. caus.) to cause to improve, to cause to become better (any work, &c.).
اونگالماق *ungal-máq* (v. intr.) to improve, to become better.
اونگاي *ungaï* (adj.) easy.
اونماک *un-mak* (v. intr.) to sprout, to shoot out from the ground.
اونوتقاق *unut-qáq* (adj.) one who makes frequent mistakes, or omissions.
اونوتماق *unut-máq* (v. tr.) to make a mistake, to forget.
اوي *üi* (subs.) house, chamber.
آوي *ùi* 1. (subs.) idea, thought; 2. (adj.) deep, profound (*lit.* and *met*).
آوي *uwi* (subs.) a bullock, an ox.
اويا *uya* (subs.) a nest, or sleeping place of an animal.

اویات	*uyat* (subs.) shame, modesty.
اویاتسیز	*uyat-siz* (adj.) shameless.
اویاتماق	*uyat-máq* (v. intr.) to feel shame.
اویالماق	*uya'l-máq* (v. pass.) to be put to shame, to be ashamed.
اویانماق	*uya-'n-máq* (v. intr.) to awake.
اویرولماک	*uyer-ul-mak* (v. pass.) to be turned, KAZ.
اویرماک	*uyer-mak* } (v. tr.) to turn, KAZ. for أورماك,) which see).
اویروماک	*uyeru-mak*
اویغاتماق	*uigha-'t-máq* (v. caus.) to cause to awake, to awaken.
اویغان	*uigháq* (adj.) awake ; *also* wide-awake, sharp, acute.
اویغانماق	*uigha-'n-máq* (v. intr. or refl.) to be awake. [? from *uï* "thought" : thus—*ui-gha-máq* (if there were such a verb) would be "to be conscious," and the Reflective *uigha-'n-máq* would be, literally, "to be conscious of one's self, *i. e.* to be awake."]
اویقو	*uiqu* (subs.) sleep.
اویقولاتماق	*uiqu-la-'t-máq* (v. caus.) to cause to sleep, to put to sleep.
اویقولاشماق	*uiqu-la-'sh-máq* (v. recip.) to sleep in company.
اویقولاماق	*uiqu-la-máq* (v. intr.) to sleep.
اویقولوق	*uiqu-luq* (adj.) drowsy after sleep.
اویلاتماق	*ui-la-'t-máq* (v. caus.) to cause to think.
اویلاشماق	*ui-la-'sh-máq* (v. recip.) to think together.
اویلاماق	*ui-la-máq* (v. tr.) to think, to reflect.
اویلاماک	*üi-la-mak* (v. tr.) to marry *or* cause to marry, to set up in life (said of the father or guardian) [lit. to make a *house*-holder of. From *üi* = house.]
اویلا نماک	*üi-la-'n-mak* (v. pass. *or* refl.) to be married, or started in life.
اویما	*öima* (subs.) an ornamental work done by cutting out a pattern and fixing it on another ground.
اویماق	*öimáq* (subs.) a thimble.
آویماق	*ùï-màq* (v. tr.) to excavate (? from *ùï* = deep).
اویناتماق	*öina-'t-máq* (v. caus.) to cause to play.
اویناش	*öinash* (subs.) a lover, KAZ.
اویناشماق	*öina-'sh-máq* (v. recip.) to play with one-another.

اوینااماق *öina-máq* (v. intr.) to play. (Probably for *öyun-a-máq*).

اویوتماق *uyu-'t-máq* (v. caus.) to cause to curdle.

اویوماق *uyu-máq* (v. intr.) to curdle, become curdled.

اویون *öyun* (subs.) play.

اویونچي *öyun-chi* (subs.) a player.

اي *é* (interj. used in addressing a person).

آي *ái* (subs.) moon, month.

آي پالتو *ái-pàltu* (subs.) a battle-axe (? from its crescent shape).

آیاشماق *àya-'sh-máq* (v. recip.) to grudge one-another.

آیاغ *áyágh* (subs.) leg, foot.

آیاغلاشماق *áyágh-la-'sh-máq* (v. recip.) to lie head and feet together (like herrings in a barrel) ; to lie with all the feet inwards to the fire.

آیاغلاماق *áyágh-la-máq* (v. tr.) to wade (on foot) across a river.

آیاق *áyáq* (subs.) a bowl (of wood or earthen ware, &c).

آیاق for آیاغ.

ایاقچي *áyáq-chi* (subs,) a cup-bearer, one who fills the bowl.

آیاماق *aya-máq* (v. tr.) to withhold, to withdraw (anything), to grudge (anyone anything).

آیانماق *aya-'n-máq* (v. refl.) to withdraw one's self from, to flinch, to shirk, to shrink from.

ایاک *iyak* (subs.) chin, KAZ.

ایبارتماک *ibàr-'t-mak* (v. cause.) to cause to send.

ایبارتتورماک *ibàr-'t-tur-mak* (v. cause. redupl.) to cause to have (something) sent, to cause to cause to send.

ایبارماك *ibàr-mak* (v. tr.) to send.

ایبریق *ibriq* (subs.) an earthenware water-jug.

ایپاک *ipak* (subs.) silk.

ایپلاشتورماک *ipla-'sh-tur-mak* (v. recip. caus.) to cause to take their proper places, to put into the proper order among themselves, or mutually.

ایپلاشماک *ipla-'sh-mak* (v. recip.) to get into one's proper places, to arrange one's selves or themselves.

ایپلاماک *ipla-mak* (v. tr.) to arrange in proper order *or* sequence.

ایت *ît* (subs.) a dog.

ایتاك	***itak*** (subs.) a skirt, lower edge.
اتالگو	*italgü* (subs.) the female of the ***Shungkár*** or ***Falco Hendersoni*** (?)
ایت‌تیش	*ít-tish* (subs.) *lit.* dog-tooth ; a kind of stitch in which the needle is passed through alternately from opposite sides [? herring bone].
ایتماك	*it-mak* (v. tr.) 1. to make, to build ; 2. to shut, fasten.
آیتماك	*aït-mak* (v. tr.) to speak, to say.
ایتیلماك	*it-il-mak* (v. pass.) 1. to be made ; 2. to be fastened,
آیتیلماك	*aït-il-mak* (v. pass.) to be said.
ایچ	*ich* (subs.) inside, interior ; *ich-i-da*=within.
ایچاک	*îchak* (subs.) entrails, Kh.
ایچاي	*îchaï* (subs.) entrails.
ایچره	*ich-'ra* see *ichkari.*
ایچقور	*ich-qur* (subs.) a waist band.
ایچقیلیق	*ich-qi-liq* (subs.)
ایچکاري	*ich-k'ari* (adv. and p. p.) inside. *See Gram., p.* 65.
ایچکو	*ichkü* (subs.) goat.
ایچماك	*ich-mak* (v. tr.) to drink.
ایچمک	*ichmak* (subs.) a saddle pad, a piece of felt going under the saddle.
ایچورماك	*ich-ur-mak* (v. caus.) to cause to drink, to give to drink.
ایداتماك	*aïda-'t-mak* (v. caus.) to cause to drive away.
ایداشماک	*aïda-'sh-mak* (v. recip.) to drive away in company.
ایداماك	*aïda-mak* (v. tr.) to drive away [the same as *haïda-mak*].
ایدي	1. *aïdi*, corr. from *aït-ti* " he said" ; 2. *idi*, contr. from *irdi* " he was."
ایر	*er* (subs.) a male, a man, a husband ; *also*, a hero, a brave man.
ایراق	*iráq* (adj.) far, distant.
آیران	*aïran* (subs.) butter-milk.
ایرانلار	*er-ánlar* (subs.) heroes, men of worth [from *er* and (?) double Plural, P. and T., as a mark of respect].
ایرتماق	*ert-màq* (v. tr.) to get the better of, to deceive (? for *àrtmàq*, qu. " to come over" vulg.)
ایرته	*erta* (subs.) morning ; (adv.) to-morrow.

ایرته‌گي	*erta-gi* 1. (subs.) a tale, a history ; 2. (adj.) belonging to the morning.
ایرجایتماق	*irjai-t-máq* (v. caus.) to cause to grin.
ایرجایماق	*irjaï-màq* (v. intr.) to laugh foolishly, to simper, to grin.
ایردي	*irdi* (part of def. verb subs.) usually contracted to *idi* [which see] "he was."
ایرسه	*irsa* (Pot. Part. of def. verb subs., prd. also *isa*) "may be."
ایرشتورماك	*irsh-tur-mak* (v. caus.) to cause to arrive up.
ایرشماك	*irsh-mak* (v. intr.) to arrive up, to arrive after.
ایرغاتماق	*irgha-t-máq* (v. caus.) *lit.* to cause to swing ; [usually] to shove, push *or* shake.
ایرغانماق	*irgha-'n-máq* (v. refl.) to swing *or* move one's self.
ایرغوتماق	*irghu-t-máq* (v. caus.) to cause to leap over.
ایرغوشماق	*irghu-'sh-máq* (v. coll.) to leap together, to leap in emulation.
ایرغوماق	*irghu-máq* (v. tr.) to leap over, to jump.
ایرکا	*irka* (adj.) pet, favourite.
ایرگاچ	*ir-gach* (vl. adj.) having been (from *ir-mak*).
ایرگاشتورماك	*irgash-tur-mak* (v. caus.) to cause to follow.
ایرگاشماک	*irgash-mak* (v. tr.) to follow of one's own accord ; to join *or* attach one's self to.
ایرکاک	*erkak* (adj.) male.
ایرکالاتماك	*irka-la-t-mak* (v. caus.) to cause to favour.
ایرکالاشماك	*irka-la-'sh-mak* (v. recip.) to favour one another.
ایرکالاماک	*irka-la-mak* (v. tr.) to pet, to favour [see *irka*].
ایرکالانماك	*irka-la-'n-mak* (v. pass.) to be petted, *or* favoured.
ایرکان	*irkan* or ایکان *ikan* (Indef. Part. of defect. verb subs. *irmak*) *lit.* "being", "having been". *Commonly used for the copula* "is". Gives a dubitative sense when joined to other verbs. See Grammar.
ایرکته	*erakta* (subs.) husband.
ایرکیت	*erkit* (subs.) sour butter-milk.
ایرکیلماك	*irk-il-mak* (v. pass.) to be strained [as any watery stuff through a cloth].

ایرکین	*irkin* or ایکین *ikin* same as *irkan.*
ایرگین	*irkin* (adj.) wide, broad, extended.
ایرکینلاشماك	*irkin-la-'sh-mak* (v. recip.) to be reciprocally at ease; to have room between one another.
ایرکینلاماك	*irkin-la-mak* (v. intr.) to be at ease, not tightened for space; to have room.
ایرماس	*ir-mas* (Neg. form of *irur*, the Continuative Part. of defective verb subs.) pronounced usually *imas*, "not being," "is not."
آیرماق	*aïr-máq* (v. tr.) to divide, to separate.
ایرماک	*irmak* (Infinitive of the defective verb substantive, not common in this form,) to be.
ایرماك	*irmak* (subs.) any trifling occupation.
ایرماکلاشماك	*irmak-la-'sh-mak* (v. recip.) to trifle with one another.
ایرماکلاماک	*irmak-la-mak* (v. intr.) to trifle.
ایرور	*ir-ur* (Continuative Part. of *ir-mak*, not common) being; *also* is.
ایرون	*irün* (subs.) lip.
ایرونماک	*irün-mak* (v. tr.) to dislike doing (? to put up one's *lip* at), to procrastinate.
ایرونوشکاك	*irün-üsh-kak* (adj.) procrastinating habitually.
ایرونوشماك	*irün-üsh-mak* (v. coll.) to procrastinate together.
آیري	*aïri* (subs.) a pitch-fork.
ایریتماک	*iri-t-mak* (v. caus.) to melt (trans.) [lit. "to cause to be in a melted state" from *iri-mak*]. [*mak*].
ایریشتورماك	*irish-tur-mak* (v. caus.) to cause to arrive up [from *irish-*
ایریشماک	*irish-mak* (v. intr.) 1. to arrive up, [same as *irsh-mak*]; 2. to melt together [recip. form of *iri-mak*].
ایریکلاماک	*irik-la-mak* (v. tr.) to sort out *or* select the largest. [nuyer."
ایریکماک	*irik-mak* (v. intr.) to be weary (not with hard work), "s'en-
آیریلماق	*aïr-il-máq* (v. pass.) to be divided [from *aïr-màq*].
ایریلیش	*aïr-il-ish* (vl. subs.) divarication, place where waters &c. separate into several channels or courses. [another.
آیریلیشماق	*aïr-il-ish-máq* (v. pass. recip.) to be divided from one

ایریماک	*iri-mak* (v. intr.) to melt, to become melted.
ایریمچیك	*irimchik* (subs.) cream-cheese.
ایرین	*irin* (subs.) lip.
ایرینچاك	*irin-chak* (adj.) procrastinating, lazy.
ایرینماك	*irin-mak* (v. intr.) to be lazy, to procrastinate (see *irün-mak*).
ایز	*iz* (subs.) track, trace, foot-track.
ایزغورماق	*iz-ghur-máq* (v. intr.) to whistle.
ایزگو	*izgu* (adj.) good.
ایزگولیک	*izgu-lik* (subs.) goodness.
ایزلاماک	*iz-la-mak* (v. tr.) to track, to follow the traces.
ایزما	*îzma* (adj.) talkative, KH.
ایزمه	*izmak* (subs.) braid, edging (of robes).
ایزماک	*iz-mak* (v. tr.) to rub up in water, to dissolve (tr.).
ایزا	*iza* (subs.) reproof, molestation, P.
ایزلاتماک	*izla-t-mak* (v. caus.) to cause to search.
ایزلاشماک	*izla-'sh-mak* (v. recip.) to search in company.
ایلاماك	*izla-mak* (v. tr.) to search.
ایزیلماک	*iz-il-mak* 1. (v. pass.) to be dissolved as in water ; 2. (v. intr.) to gossip, to chatter (see *izma*).
ایس	*îs* (subs.) smell, aroma ; *also* the sickness &c., caused by rarity of the air at high elevations ; memory, recollection, understanding.
آیس	*(üs) is* (subs.) grime, the dirt formed on walls, &c., by smoke.
ایسان	*isan* (adj.) safe, well, KAZ. KH.
ایسانلاشماک	*isan-la-'sh-mak* (v. recip.) to ask mutually after one another's welfare.
ایسانلیك	*isan-lik* (subs.) safety, welfare.
آیستاتماک	*ista-t-mak* (v. caus.) to cause to search.
ایستاشماك	*ista-'sh-mak* (v. recip.) to search together.
ایستاماك	*ista-mak* (v. tr.) to search for.
ایسکاتماك	*îska-t-mak* (v. caus.) to cause to smell.
ایسکاشماك	*îska-'sh-mak* (v. recip.) to smell (tr.) together.
ایسکاك	*iskak* (subs.) a pair of tweezers.

ايسكاماك *íska-mak* (v. tr.) to smell, to snuff.

آيسلاماق *(üs) is-la-máq* (v. tr.) to make grimy with smoke.

ايسلاماك *ís-la-mak* (v. intr.) to suffer from the rarity of the air.

ايسلانماك *ís-la-'n-mak* (v. refl.) to smell (intr.), to give out an odour.

آيسلانماق *(üs) is-la-'n-máq* (v. pass.) to be made grimy with smoke; to become grimy.

ايسيتما *isit-ma* (subs.) fever, feverishness.

ايسيتماق *isi-t-máq* (v. caus.) to cause to be hot, to heat. (From primitive *isi-mák* of *issik* "hot.")

ايسرغه *isargha* (subs.) ear-ring.

ايسرماك *isar-mak* (v. intr.) to become drunk, tipsy.

ايسارك *isaruk* (adj.) drunken, tipsy.

ايسكي *iski* (adj.) old, worn out, KH., KAZ.; and thence, "bad" (in which meaning chiefly it is used in Eastern Turkistán).

ايسليك *is-lik* (adj.) intelligent, sharp [from *is*].

ايش *ish* (subs.) work, labour, deed, business.

ايش *ísh* (subs.) a companion, comrade. (Possibly the origin of the verbal affix of reciprocity "*ish*.")

ايشاك *eshak* (subs.) donkey, ass.

ايشاك مونجاق *eshak-munjáq* (subs.) common glass beads [lit. "donkey beads," *i. e.* second-rate ones. Conf. "donkey-engine"].

ايشان *eshán* (subs.) a title applied in Turkistán to religious teachers [? the P. *eshán* = "they;" the *Pl.* being used as a mark of respect; or else from following series].

ايشانچي *ishán-ji* (subs.) a confidential person, one in whom confidence is felt.

ايشاندورماق *ishán-dur-máq* (v. caus.) to cause to put confidence in, to cause to believe.

ايشانماق *ishán-máq* (v. tr.) to put confidence in, to believe, KH., KAZ.

ايشتماک *ishit-mak* (v. tr.) to hear.

ايشتتورماک *ishit-tur-mak* (v caus.) to cause to hear, to relate.

ايشكاك *ishkak* (subs.) a paddle [from *ishmak*].

ايشك *ishik* (subs.) a door, a gate.

ايشلاتماک *ish-la-t-mak* (v. caus.) to cause to work.

ایشلاماك	*ish-la-mak* (v. tr.) to work [from *ish*].
ایشقار	*ish-qár* (subs.) potash.
ایشقیریشماق	*ishqir-ish-máq* (v. recip.) to whistle to one another.
ایشقیرماق	*ishqir-máq* (v. intr.) to whistle.
ایشکالي	*ishkali* (subs.) a horse hobble.
ایشماك	*ish-mak* (v. tr.) 1. to twist or plait ; 2. to paddle.
ایشیتماک	*ishit-mak* (v. tr.) to hear.
ایشیلماک	*ishi'l-mak* (v. pass.) 1. to be heard ; *also* 2. [*ish-il-mak*] to be twisted, or to be plaited.
آیغور	*aïghur* (subs.) an entire horse, a stallion.
ایکاك	*ikak* (subs.) a file (instrument for filing).
ایکان	*ikan* (Indefinite Part. of defective verb (*i*(*r*)*mak*) " being *or* having been", *used as copula* " is."
ایکاو	*ikao* (num. subs.) both.
ایکاولان	*ikaolan* (num. subs.) both.
ایکایلان	*ikaïlan* (num. subs.) both.
ایکي	*iké* (num.) two.
ایکیدین	*iké-din* (adv. expr.) by twos [*bir-din iké-din* = by ones and twos].
ایکینچي	1. *iki-'nchi* (num. adj.) second ; 2. *ikin-chi* (subs.) a cultivator [see *ikin*].
ایکین	*ikin* 1. (part.) see *ikan ;* 2. (subs.) a young crop.
ایکین بیرین	*ikin birin* (adv. expr.) by twos and ones.
ایکا	*iga* (subs.) master, owner, *also* husband.
ایکاچي	*iga-chi* (subs.) elder sister.
ایکار	*igar* (subs.) saddle.
ایکاك	*igak* (subs.) a file.
ایکالاماک	*iga-la-mak* (v. tr.) to become master of, to rule or govern, to own.
ایکالانماک	*iga-la-'n-mak* (v. refl.) to make one's self master of ; *also* (spec.) to frequent, to haunt.
ایکاو	*igao* (subs.) a file.
ایکماك	*ig-mak* (v. tr.) to bend.
ایکنه	*igna* (subs.) a needle.

ایگیرماك	*igir-mak* (v. tr.) to spin.
ایگیز	*igiz* (adj.) high, tall ; *also* deep.
ایگین	*igin* (subs.) a young crop [see *ikin*].
ایگین	*igin* (subs.) clothes, clothing.
ایگینچي	*igin-chi* (subs.) a cultivator [see 1st *igin*].
ایگیلماك	*ig-il-mak* (v. pass.) to be bent.
ایل	*il*, 1. (subs.) a country (vide *Roum-elia*=The country of Roum) ; 2. (adj.) allied, in alliance.
آیل	*aïl* (subs.) a girth.
آیلا	*aïla* (subs.) elder sister ; *also* an old woman.
ایلات	*ilât* (subs.) any nomad tribe.
ایلاتماك	*ila-t-mak* (v. caus.) to cause to sift.
ایلاشما ک	*ila-'sh-mak* (v. recip.) to sift in company [also used in Yarkand for *irgash-mak*].
ایلاماك	*ila-mak* (v. tr.) 1. to sift, to pass through a sieve ; 2. to mix dough ; 3. to tan (leather).
آیلاماك	*aïla-mak* (v. tr.) to make, to do.
ایلان	*īlán* (subs.) a serpent, a snake.
آیلاندورماك	*aïlan-dur-mak* (v. caus.) to cause to turn.
آیلانماك	*áïlan-mak* (v. intr.) to turn (of itself), to be turned.
آیلانوشماك	*aïlan-ush-mak* (v. recip.) to turn together.
ایتماك	*ilt-mak* (v. tr.) to take away (chiefly used in comp. as *iltip birmak* "to take away and give)."
ایلتماك	*ilt-mak* (v. intr.) to become dizzy through smoking, &c.
ایلچي	*il-chi* (subs.) an Ambassador, a negotiator [from *il* "allied"] ; *also* (prop. name) the capital of Khotan.
ایلدام	*ildam* (adv.) quickly.
ایلغاتماق	*ilgha-'t-máq* (v. caus.) to cause to sort.
ایلغار	*il-ghàr* (subs.) a frontier station of troops, an advanced guard, a raid.
ایلغاشماق	*ilgha-'sh-máq* (v. recip.) to sort together.
ایلغاماق	*il-gha-máq* (v. tr.) to sort by hand, to pick out, to search, to investigate ; (intr.) to advance, to attack, to make a raid.

ایلغانماق	*ilgha-'n-máq* (v. refl.) to sort themselves.
ایلقي	*ilqi* (subs.) a troop of horses, a stud.
ایلقچي	*ilq-chi* (subs.) a guardian of a troop of horses.
ایللاشتورماك	*il-la'sh-tur-mak* (v. recip. caus.) to cause alliance between, to mediate.
ایللاشماك	*il-la-'sh-mak* (v. recip.) to enter into alliance together [from *il* "allied"].
ایلق	*iliq* (adj.) warm.
ایلگاري	*il-gari* (adv. and p. p.) in front, formerly ; *also*, before (governs negative).
ایلماك	*il-mak* (v. tr.) to hang up (as on a peg), to hitch into.
ایلمه	*ilma* (subs.) a particular stitch, "chain-stitch."
ایلیک	*ilik* (subs.) 1. a hand [unusual in Yarkand] ; 2. marrow.
ایلیك بولماق	*ilik bol-máq* (comp. verb) to go security.
ایللیك	*illik* (num.) fifty [? conn. with *ilik* "hand"].
ایلینماك	*il-in-mak* (v. pass.) to be hung up.
ایماس	*imas* (part of defective verb subs.) " is not" [for *ir-mas*].
آیماق	*aïmâq* (subs.) a tribe, the descendants of a particular person ; *also* (prop. n.) a tribe near Herát.
ایمانماك	*imán-mak* (v. intr.) to be respectful, to show respect.
ایمچاك	*imchak* (subs.) a woman's breast.
ایمچاکداش	*imchak-dash* (subs.) a foster brother or sister [lit. breast companion].
ایمچي	*îm-chi* (subs.) an empiric, a quack.
ایمدي	*im-di* (conj.) now.
ایمگاك	*im-gak* (verb. subs.) excessive labour and weariness consequent thereon, trouble, difficulty [from obs. prim. *im-ga-mak*].
ایمگانماک	*im-ga'n-mak* (v. refl.) to be wearied with excessive labour of any kind.
ایملاتماك	*îm-la-t-mak* (v. caus.) to cause to treat empirically.
آیملاشماك	*im-la-'sh-mak* (v. recip.) to make signals to one-another by nodding or winking.
ایملاماك	*îm-la-mak* (v. tr.) to treat empirically, to act as a quack doctor.

آیملاماك	*im-la-mak* (v. tr.) to make signs by nodding or winking to any-one.
ایمماك	*im-mak* (v. tr.) to suck [the breast, as an infant].
ایموکداش	*im-uk-dash* (subs.) a foster brother or sister.
ایمیزماك	*im-iz-mak* (v. caus.) to cause to suck, to give an infant the breast.
امیزوک	*im-iz-uk* (subs.) a contrivance for artificially feeding an infant.
ایمیش	*imish* [part of defective verb subs.] " it is understood to be."
ایمشماک	*im-ish-mak* (v. recip.) to suck together from the same breast [of foster brothers, &c.].
این	*în* (subs.) width, breadth.
اینا	*ina* (subs.) mother, Kaz.
اینا	*ina* (subs.) needle, Kaz.
ایناق	*ináq* (subs.) a confidential servant.
آیناک	*äinak* (subs.) a cow.
ایناگه	*inaga* (subs.) a nurse (of children).
ینانماق	*inan-máq* (v. intr.) to believe, to trust [governs *gha*].
اینجي	*inji* (subs.) a pearl.
اینجیگه	*injiga* (adj.) fine (as opposed to coarse).
ایندا‌شماک	*inda-'sh-mak* (v. recip.) to beckon to one another.
ایندا‌ماک	*inda-mak* (v. tr.) to beckon, to summon.
آینک	*aïnak* (subs.) eye-glass, spectacles, P.
اینگاک	*ingak* (subs.) chin.
اینگان	*ingan* (subs.) a female camel.
آینوتماق	*áïnu-t-máq* (v. caus.) 1. to cause to fade, &c. ; 2. to cause to become sober.
آینوشماق	*áïnu-'sh-máq* (v. recip.) 1. to fade, &c. together ; 2. to become sober together.
آینوماق	*áïnu-máq* (v. intr.) to fade, to lose colour or flavour.
آینوماق	*áïnu-máq* (v. intr.) to become sober.
اینی	*ini* (subs.) a younger brother, Kh.
آیوان	*aïwán* (subs.) a veranda, a colonnade, P.
آیو	*áyu* (subs.) a bear, Kaz.
آییغ آییق	*áyigh áyiq* (subs.) a bear.

اییک *iyik* (subs.) a distaff.

اییماک *iyı-mak* (v. intr.) to become soft, to relax (as a man's wrath, or the udders of a cow when the calf is put to her previous to milking) KAZ.

ب

بابا *bâbâ* (subs.) father, *or* grandfather (used in the former sense chiefly by children, like our "papa").

باباق *bàbàq* (subs.) father *or* grandfather; *also* child.

باتماق *bât-máq* (v. intr.) to sink (as the feet in mud); *also* to penetrate.

باتور *bâtur* (subs. and adj.) a brave man; brave [corr. of "bahádur," P.].

باتوق *bâtuq* (subs. and adj.) ground where the feet sink, a quagmire (applied also to deep sand).

باجا *bâja* (subs.) the husband of one's wife's sister.

باخشلاشماق *bakhsh-la-'sh-máq* (v. recip.) to give to one another, P. T.

باخشلاماق *bakhsh-la-máq* (v. tr.) to give, to grant, to forgive, P. T.

باخشي *bakhshi* (subs.) a strolling minstrel, an inspired bard (pretending to receive inspiration from supernatural beings); *also* a hunter.

بار *bàr* prd. generally *bà* (subs.) existence, being, presence, (cf. Germ. *dasein*); *also* that which exists; (adj.) existent, being, present. *When apparently used as a verb it may be translated* "there is" (Germ. *es gibt*). Thus *hàkim bàr* = 'there is a Governor' (a Governor exists), whereas *hàkim dur* or *hàkim ikan* would be "(he) is Governor."* *Bàr* is an attribute in itself; *dur* or *ikan* is the mere means of connecting a subject with an attribute. [*Bàr* is never really a verb, although it might appear so from certain uses of it. E. g. *àt bàr* would be translated "there is a horse;" but in reality this is a phrase in the common Turki form, like *àt chung* "the horse (is) big"—where the copula is wanting. Thus *àt bàr* is literally "the horse (is) existent." *Bàr* is never a copula, being itself an attribute. And it does not contain the copula, any more than any other adjective used in a similar way. The copula is *sous-entendu.* The use of *bàr* for our verb "to have" is another case of the above; e. g. *maning àt-im bàr* = "my horse (is) existent," i. e. I have a horse. Here "my horse" is the subject and "existence" is the attribute; and there is no verb expressed. The subject and attribute are merely connected by collocation as in other cases. Even with pronouns and seeming auxiliary verbs, *bàr* is merely an adjective: e. g. *bàr-man* "I (am) existent" is like *kichik man* "I (am) small"; *shèkh bàr idi* "a shèkh was existent" is like *shèkh pír idi* "the shèkh was old" (in the Past tense the copula of that tense is introduced, in both cases). Thus it is merely as a *memoria technica* that *bàr* can be said to correspond with the English "there is." It really corresponds better with the "there" of that expression. Its use as an unmistakable substantive or adjective requires no explanation: e. g. *bàr-i-ni tutti* "what-there-was of-his he took;" *ahl-im bàr üi* "the house where my wife is present" (an elliptical expression).

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* There is the same distinction in the Tibetan and Burmese languages. In the former *yod-pa* or *dug-pa* means "to exist," "to be found at a place," while *zin-pa* is the mere means of connecting the attribute with its subject [Jaeschke's Tibetan Gram. § 39]. Again in Burmese *shi-thi* is the real verb substantive denoting concrete existence, while '*pyi*(*s*)-*thi* is a copula denoting connection of some sort between a subject and an attribute: thus *myiñ shi-thi* = "*there is* a horse," while *myiñ* '*pyi*(*s*)-*thi* = "(it) *is* a horse."

These remarks may be generalised. What *bàr* still is, all Turki verbs seem formerly to have been, and even now are in their essence. Unlike *bàr* they are affected by certain agglutinated syllables which make of them separate substantives or adjectives connected with different tenses or modes of action &c. But like *bàr* they all require a copula to be understood. It might almost be said, paradox as it seems, that there are no verbs in Turki, only substantives and adjectives. At any rate in external form there is no difference between the application of a noun of action (or suffering, or condition) and any other attribute. Take as an example any verb-tense (so-called): e. g. *qelur-man.* This, as it stands, is "continuously-doing I," where a copula, mentally supplied, is necessary to make this signify "I (am) continuously doing." So with other tenses. But it may be thought that the auxiliaries which are sometimes used as copulæ, must be true verbs. On the contrary *dur* is an adjective meaning "continuously standing"; *ikan* is an adjective, "indefinitely being"; *irur* is a substantive or adjective "continuously doing"; *irdi* is a substantive in the possessed form of the 3d. pers. sing. *(ird-im, ird-ing, ird-i* are as regular substantive formations as *àt-im, àt-ing, àt-i* "my horse," "thy horse", "his horse", and mean literally "my past-being", "thy past-being", "his past-being"). In no part of the so-called verb do we find an expression which is itself a statement without requiring a copula to be mentally supplied; and no where do we find such a copula to supply in the last instance. It does not exist. Collocation is the only true copula in Turki. A so-called verb is only an attribute attached to a subject under the rules applicable to substantives and adjectives. The fact of its being an attribute of action, or suffering, or condition, makes its form of application differ in no way from that of any other substantive or adjective. *Urup-man* "I (have) struck (having-completed-striking I)" does not differ in form from *kichik man* "I (am) small", nor *qelghu'm-bàr* "I have to do (future-doing of-mine existent)" from *àt-im bàr* "I have a horse (horse of-mine existent)."]

بارچه *bàr-chah* (adv. and pron.) wholly, *also* all, the whole. (*Lit.* 'to the amount of what there is': from *bàr* wh. s., and *chah* "extent").

بارس *bárs* (subs.) an ounce, "white leopard" (so called).

بارغاق *bargháq* (subs.) a receipt or discharge in full given by the officials for Government demands which have been paid (in kind).

بارليق *bár-liq* (subs.) existence, being; (also adj.) possessing property, [from *bár*, see above].

بارماق *bár-máq* (v. intr.) to go.

بارماق *bârmâq* (subs.) a finger.

باش بارماق *básh-bármáq* 'the head finger,' 'the thumb' (also *bash-maldaq) ; eshak-qol,* lit. 'donkey hand,' the 1st finger; *otra-qol*, lit., middle hand, 'the middle finger;' *yán qol*, lit. side hand, 'the ring finger;' ***chimchilak*** 'the little finger.'

باستورما *basturma* (subs.) a shed.

باستورماق *bas-tur-máq* (v. tr.) to cause to tread [see *bas-máq*].

باستوروق *bastur-uq* (verb. subs.) a pole tied across a loose load to keep it together by pressure [from *bas-tur-máq*].

باسقان *basqan* (subs.) a sledge-hammer.

باسقون *basqun* (subs.) a night-mare, (connected with *basmáq* "to press").

باسما *basma* (adj.) impressed, stamped, printed; (subs.) printed calico, print.

باسماق *bas-máq* (v. tr.) to press, impress, print, stamp; *also* to tread, to tread out (as corn).

باسوروق *basuruq* (subs.) an instrument for using pressure [see *basturuq*], a press.

باسوق *bas-uq* (verb. adj.) oppressed, humble, meek, quiet.

باسيق *basiq—the same.*

باش *básh* (subs.) head, *also* chief, *also* the first.

باشه *básha* (subs.) a sparrow-hawk.

باشاق *básháq* (subs.) the iron point of an arrow.

باشباق	*básh-báq* (subs.) the halter for tying up a cow &c., [from *básh* and *bágh-la-máq*.]
باشتوخي	*básh-tukhi* (subs.) *lit.*, first cock, *i. e.* cock-crow, day-break.
باشچي	*básh-chi* (subs.) a leader *or* guide.
باشقا	*báshqa* (adj.) separate, other.
باشلاتماق	*básh-la't-máq* (v. caus.) to cause to precede, guide.
باشلاماق	*básh-la-máq* (v. tr.) to precede, guide ; *also* to renew.
باشلانماق	*básh-la'n-máq* (v. refl.) to guide one's self.
باشلغين	*bàshlighin* (adv.) leading, first.
باشمالداق	*básh-maldáq* (subs.) the thumb, the chief finger.
باشرق	*báshuq* same as *básháq*.
باشے	*báshi* [used in comp. to mean "a chief;" originally the possessed form 3rd person, from *básh*, *e. g. yüz-báshi* for *yüz-ning básh-i*, lit. the head of a hundred].
باغ	*bágh* (subs.) a garden, P. ; *also* a bundle of hay (or straw).
باغچه	*bágh-chah* (subs.) a little garden, P. T.
باغلاتماق	*bâgh-la-'t-mâq* (v. caus.) to cause to bind.
باغلاشماق	*bâgh-la-'sh-máq* (v. recip.) to bind one-another, *or* to bind in company.
باغلاغليق	*bâgh-la-'gh-liq* (verb. adj.) bound, in a bound condition.
باغلاماق	*bágh-la-máq* (v. tr.) to bind.
باغليق	*bágh-liq* (subs.) wisp or rope with which a bundle or sheaf is bound.
باغير	*bághir* (subs.) liver (of an animal).
باغيش	*bághísh* (subs.) a joint or articulation.
باغيش لاماق	*baghish-la-máq* (v. tr.) to give, to grant, to forgive [corr. from *bakhsh*, P.].
باق	*báq* the same as *bágh*.
باقا	*báqá* (subs.) a frog.
باقاچاناق	*báqa-chanáq* (subs.) a tortoise [*lit.* "a frog in a hole" from *chanáq* = a hole].
باقّال	*baqqál* (subs.) a grocer, green-grocer, seller of uncooked provisions. A.

باقالچاق *baqálcháq* (subs.) the pastern bones of a cow or sheep.

باقتورماق *baq-tur-máq* (v. caus.) to cause to look, to show.

باقچا *báqcha* (subs.) the same as *bágh-cha.*

باقماق *báq-máq* (v. tr.) to look, to inspect, to look after or take care of ; to perceive with any of the senses.

باقيشماق *báq-ish-máq* (v. recip.) to look at one another, to look at *or* after (in company).

باقين *báqin* (adj.) being fattened [corr. from *báqqàn* "which is looked after"] *used of a sheep, &c. ; also* dependent (*of a man*).

باكاول *bakául* (subs.) a cook.

بالا *bála* (subs.) a child, *or* the young of an animal.

بالابارقه *bála-barqa* (subs.) children, family (including the women of a household). Cf. Hind. *bál-bacha.*

بالاق *báláq* (subs.) the lower part (below the knee) of trousers.

بالالاماق *bála-la-máq* (v. tr.) to bring forth young.

بالچيق *bálchiq* (subs.) mud.

بالداق *báldáq* (subs.) a mace or truncheon with a wrist-strap.

بالقا *bálqa* (subs.) a hammer.

بالدير *báldir* (adv.) before, first, formerly.

باي *baï* (subs. and adj.) a rich man, a merchant ; *also* rich, wealthy.

بايا *báya* (adv.) just now, lately.

باياغي *báyaghi* }
باياقي *báyaqi,* } (adj.) early, former.

باي بچه *baï-bachah* (subs.) the son of a rich man, a person of independent means, T. P.

باي بيچه *báï-bichah* (subs.) the chief wife, the first wife, KAZ.

بايتال *baïtal* (subs.) a mare over four years of age which has not had a foal.

بايرق *báïrak* (subs.) the standard of a *yüzbáshi* or centurion.

بايري *baïri* (subs.) a square of any stuff ; (piece-goods were formerly sold by the squares of their width).

بايري *baïri* (adj.) old, of long service (said of domesticated animals).

بایقوش	*baï-qush* (subs.) an owl [as if "the rich or respectable bird" (*qush* = bird)], Kaz.
بایقیز	*baï-qiz* (subs.) *the same as last.*
بایلاشماک	*baï-la-'sh-mak* (v. recip.) *the same as* baghlashmak, Kaz.
بایلاماک	*baï-la-mak* (v. tr.) *same as* baghlamak, Kaz.
بایلوق	*báï-luq* (subs.) rich-ness ; *also* Kaz. *for* bagh-liq.
بایوتماق	*baï-ut-máq* (v. caus.) to enrich, Kaz.
بایوماق	*baï-u-máq* (v. intr.) to become rich, Kaz.
بحیللاتماک	*bahil-la't-mak* (v. caus.) to cause to remit *or* forgive, A. T.
بحیللاشماک	*bahil-la-'sh-mak* (v. recip.) to remit to one-another, A. T.
بحیللاماک	*bahil-la-mak* (v. tr.) to remit *or* forgive, A. T.
بحیللیق	*bahil-liq* (subs.) forgiveness.
بر	*bir* (num.) one.
برار	*birar* (adv.) singly, one by one.
براو	*birao* (subs.) a single one (as 'a pair' is said of two).
براو	*burrao* (subs.) a gimlet, Kaz.
براولان	*biraolan* (subs.) a single one, Kaz.
برایلان	*biraïlan* (subs.) a single one.
بربولماق	*bir-bolmáq* (v. intr.) to become of one accord, *lit.* to become one.
برگا	*bir-gá* (adv.) together [probably from P. *gáh* = time or place].
برلا	*birla* (post-pos.) with (see *birlan*).
برلاتماک	*bir-la-t-mak* (v. caus.) to cause to become one, to unite.
برلان	*birlan* (post-pos.) with ; *also* by, through (a line or locality) e. g. *Kàshqar yoli birlan* = by the Kàshghar road, *ichi birlan ütüp* = having passed through the interior of it. *Also used as a conjunction for* and : e. g., *át birlan át-lik* = horse and rider ; *shahr birlan tàgh-ning ara-si-da* = between the town and the hill, *lit.* in the middle (or interval) of the town and (with) the hill. (Probably contr. from *bir-aïlan* = a single one, and so 'in one,' 'together.' See Gram. p. 70, N.B.).
برلانچی	*bir-lanchi* (num. adj.) first, foremost, Kaz.
برلاشماک	*bir-la-'sh-mak* (v. recip.) to become of one accord, together.

برنجي *bir-in-ji* (num. adj.) first, foremost.

برو for براو

بريكتورماك *bir-ik-tur-mak* (v. caus.) to cause to unite.

بريكشماك *bir-ik-ish-mak* (v. recip.) to unite together.

بريكماك *bir-ik-mak* (v. intr.) to become joined, to unite.

برين برين *bir-in bir-in* (adv.) by ones, singly.

برين ايكين *bir-in iki-'n* (adv.) by ones and twos.

بز *biz* (pron.) we.

بشارت (? for بشارط or for اشارت A.) *used to mean* a heavenly revelation or command conveyed in a vision.

بغلاماق *bagh-la-máq* (v. tr.) to bind.

بغرا for بوغرا

بللا *bülla* or *billa* (adv.) together, in one.

بلازوك *bülázök* (subs.) a wrist [derived from *bülak*, fore-arm, and *özök* = ring *or* hoop].

بلاك *bülak* (subs.) fore-arm.

بلان *bülán or bilán, see* birlan.

بلچيق *balchiq, see* بالچيق

بلماك *bülmak, see* بيلماك

بناگاه *ba-nàgàh* (adv. and conj.) suddenly, unawares, P. *but used for* if perchance.

بو *bú* (pron.) this (short form of *bul*).

بوا *búa* (subs.) an old man.

بوبا *búba* (subs.) *the same.*

بوباك *bubak* (subs.) father, grandfather.

بوبي *bubi* (subs.) a lady [for *bibi*].

بوبيچه *bubicha* (subs.) *the same* [antiquated].

بوتا *bota* (subs.) a young camel.

بوتا *butta* (subs.) a small plant.

بودنه *búdana* (subs.) a quail.

بودرشقاق *budushqáq* (subs.) a burr (which sticks in sheep's fleeces or woollen clothes).

بور *bur* (subs.) plaster, KAZ.

بورا *bora* (subs.) matting made of plaited reeds; *also* woollen sacking, *from* P.

بوراتماق	*bura-t-máq* (v. caus.) to cause (a person) to smell.
بوراشماق	*bura-'sh-máq* (v. recip.) to smell in company.
بوراغ	*burágh* (subs.) scent, odour, (from *bura-màq*).
بوراق	*burá'k, the same.*
بوراک	*búrak* (subs.) kidney.
بوراماق	*bura-máq* (v. tr.) to smell (used of the person who perceives the odour).
بوراماق	*bura máq* (v. tr.) to wring.
بوراماق	*bora-máq* (v. intr.) to blow or rage (as a storm).
بوران	*borán* (subs.) a storm.
بورداقي	*burdáqi* (adj.) fattened, fed up.
بورک	*burk* (subs.) a small cap.
بورکاشماک	*burka-'sh-mak* (v. recip.) to cover *or* veil one-another, KAZ.
بورکاماک	*burka-mak* (v. tr.) to veil, to muffle, to cover with a cloth, KAZ.
بورگانماک	*burka-'n-mak* (v. refl.) to veil one's self.
بورگا	*burga* (subs.) a flea.
بورگوت	*burgut* (subs.) the golden eagle [used for sporting purposes].
بورنا	*burna* (adv.) anciently.
بورناغي	*burnághi* (adj.) old, ancient.
بورناقي	*burnáqi*
بوروت	*burut* (subs.) moustache.
بوروشماک	*burush-mak* (v. recip.) to pucker, to gather (together) [intr.). From an imaginary or obsolete primitive *bur-mak* or *buru-mak.* [KAZ.]
بوروق	*buruq* (subs.) the root of a kind of reed sometimes eaten
بوروق	*búruq* (subs.) command, order (corr. from *buyuruq*).
بوروک	*buru'k* (subs.) a pucker, a gather.
بوروکماک	*buruk-mak* (v. tr.) to blow water out of the mouth.
بورون	*burun* (subs.) nose.
بورون	*burun* (post.-pos.) before, previous to. (See the next preceding.)
بورون	*búrun* (subs.) a surety, bail.
بوري	*bori* (subs.) a wolf.
بوريا	*boriá* (subs.) reed-matting, P.

بوز *böz* (subs.) white cotton cloth.

بوز *bóz* (adj.) grey (used of animals, also of distance or dawn).

بوزا *boza* (subs.) a weak intoxicating liquor made from various grains, KH.

بوزاغ *buzàqh*
بوزاق *buzàq*
بوزاک *buzak*
بوزاو *buzao*
(subs.) a calf (? conn. with *buz-la-máq*).

بوز بوغا *boz-bugha* (subs.) ginger, KAZ.

بوز بوقا *boz-buqa, the same,* KAZ.

بوزچي *böz-chi* (subs.) a weaver.

بوزغونج *buzghunj* (subs.) a gall-nut found on the pistachio tree, used in dyeing, as a mordant.

بوزلاشماق *buz-la-'sh-máq* (v. recip.) to bellow in company (young camels &c.).

بوزلاماق *buz-la-máq* (v. intr.) to bellow (as a young camel &c.).

بوزماق *buz-máq* (v. tr.) to ruin, to destroy, to lay waste, to spoil.

بوزوق *buz-uq* (v. adj.) deserted, ruinous ; *also* abandoned *or* wicked.

بوزوقلوق *buz-uq-luq* (subs.) ruinousness, abandonment ; *also* a desert place.

بوزولماق *buz-ul-máq* (v. pass.) to be ruined, to be laid waste, to come to grief.

بوس *bus* (subs.) steam, *also* fog *or* mist.

بوساغه *bosaghah* (subs.) a threshold (for *bosa-gáh* "the place of kissing" P.).

بوسماک *bös-mak* (v. tr.) 1. to burst ; 2. to shovel along earth, &c. with the hands.

بوسورماق *bos-ur-máq* (v. tr.) to weight, to put a weight on anything to keep it down.

بوسو روق *bos-ur-uq* (subs.) anything used for weighting down.

بوسولماک *bös-öl-mak* (v. pass.) to be burst *or* split.

بوش *bósh* (adj.) empty ; *also* useless, vain (our "bosh").

بوشاتماق *bósh-a't-máq* (v. caus.) to cause to be empty, to empty.

بوشاشماق *bósh-a'sh-máq* (v. recip.) to empty together, *also* to 'discharge' a laborious task.

بوشاماق *bósh-a-máq* (v. intr.) to be empty, to have discharged a task or duty, to be tired.

بوشانماق *bósh-a'n-máq* (v. refl.) to make one's-self empty or free from a task, to acquit oneself, to discharge a duty.

بوشوک *bôshük* (subs.) a cradle (either rocking or swinging from the ceiling).

بوغ *búgh* (subs.) an earthenware trumpet used for giving notice that a mill is at leisure, or public baths are ready, P.

بوغ *bugh* (subs.) steam.

بوغاز *bughaz* (subs.) corn (considered as food for animals).

بوغاز *bughaz* (subs.) a throat, *also* the axis of an upper mill-stone where the orifice is.

بوغاز *bughaz* (adj.) pregnant.

بوغازلاتماق *bughaz-la-'t-máq* (v. caus.) to cause to cut the throat.

بوغازلاشماق *bughaz-la-'sh-máq* (v. recip.) to cut throats mutually, or in company.

بوغازلاماق *bughaz-la-máq* (v. tr.) to cut the throat, "égorger."

بوغچي *búgh-chi* (subs.) a man who blows the *búgh*.

بوغداي *bughdaï* (subs.) wheat.

بوغدورماق *bugh-dur-máq* (v. caus.) to cause to seize by the throat.

بوغرا *búghra* (subs.) a male camel.

بوغماق *bugh-máq* (v. tr.) to throttle, to strangle, to constrict the throat of a bag, &c.

بوغو *bughü* (subs.) a stag *(Cervus Maral)*.

بوغوز *bughuz, the same as* bughaz.

بوغوزلاماق *bughuz-la-máq, see* bughaz-la-máq.

بوغوشماق *bugh-ush-máq* (v. recip.) to throttle one another.

بوغولماق *bugh-ul-máq* (v. pass.) to be throttled *or* strangled; to have the throat constricted by anger (so as not to be able to speak).

بوغوم *bughum* (subs.) }
بوغون *bughun* (subs.) } a joint *or* articulation.

بوق *boq* (subs.) excrement.

بوقا *buqá* (subs.) a bull.

بوقچا *buqcha* (subs.) a bundle, any cloth used for wrapping up a bundle.

بوقماق *buq-máq* (v. intr.) to be concealed behind anything, to lie in ambush.

بوقو *buqu* (subs.) the wooden framework of a plough.

بوقوشماق *buq-ush-máq* (v. recip.) to conceal oneself one from another.

بوقونماق *buq-un-máq* (v. refl.) to conceal oneself.

بوك *buk* (subs.) a cap [contr. from *burk*].

بوكرايماك *bukuraï-mak* (v. intr.) to stoop, to bend.

بوكرماك *búkur-mak* (v. intr.) to moo as a cow.

بوكماك *búk-mak* (v. tr.) to soak any grain in water.

بوكماک *buk-mak* (v. tr.) to hem, to sew the edge.

بوگون *bú-gön* (adv.) to-day [from *bú* " this" and *kön* " day]."

بول *bul* (pron.) this.

بولاشتورماق *bol-ash-tur-máq* (v. recip. caus.) to make peace between, to [reconcile.

بولاشماق *bol-ash-máq* (v. recip.) to be reconciled to one another (? reciprocal form of *bol-máq*, see *bolushmàq).*

بولاک *búl-ak* (adj.) separate, other; (subs.) a division, a detachment [from *bul-mak*].

بولاكلاتماک *búl-ak-la-'t-mak* (v. caus.) to cause to separate.

بولاكلاشماک *búl-ak-la-'sh-mak* (v. recip.) to go asunder, to separate from one another.

بولاكلاماک *búl-ak-la-mak* (v. tr.) to divide, to separate, to disunite, to parcel out.

بولاق *buláq* (subs.) a spring of water.

بولاماق *bula-máq* (v. tr.) to stir up, to mix; *also* to rob.

بولاماك *see* بولماک

بولامیق *bulámiq* (subs.) gruel, thick soup made with flour, " stir-[about."

بولان *bulá'n* (v. subs.) robbery, pillage.

بولانچي *bulá-'n-chi* (subs.) a robber.

بولانماک *bulá'n-mak* (v. refl.) to separate oneself; *also* to support oneself, to rest upon *(iki ulugh tágh-gha bulanip dur-miz* = " We rest upon two mighty mountains").

بولاي *búlaï* (subs.) a whet-stone and touch-stone for gold, &c.

بولتور	*bultur* (adv.) last year, during last year.
بولتورغي	*bultur-ghi* (adj.) belonging to last year.
بولجاق	*buljáq* (subs.) a rendezvous, a station for troops (*see* ملجاء)
بولدورماق	*bol-dur-máq* (v. caus.) to cause to become; *spec.* to reduce a horse to bad condition.
بولغاتماق	*bulgha-'t-máq* (v. caus.) to cause to stir.
بولغاشماق	*bulgha-'sh-máq* (v. recip.) to stir one another.
بولغاماق	*bulgha-máq* (v. tr.) to stir round (as with a spoon); to spoil (an affair).
بولقا	*bolqá* (subs.) a small hammer.
بولماق	*bol-máq* (v. intr.) to become, to be, *also* to be done *or* completed; *or conv.* to have effected one's purpose; (of a horse) to be done up; [in the future tenses] to suffice, to subserve, to do, to be good, *e. g. bola-dur*, " it will do."
بولماك	*búl-mak* (v. tr.) to divide, to partition, to parcel out.
بولوت	*bülüt* (subs.) a cloud.
بولوشتورماق	*bol-ush-tur-máq* (v. recip. caus.) to cause to be reconciled to one another.
بولوشماق	*bol-ush-máq* (v. recip.) to be reconciled to one another, *lit.* to become (one) with one another.
بولوشماك	*búl-ush-mak* (v. recip.) to divide amongst one-another.
بولوم	*bulum* (subs.) strength, firmness; (adj.) strong, firm.
بولونگ	*bulung* (subs.) a corner of any enclosed space.
بولونماق]	*bolun-máq* (pass. form of *bol-máq*). To understand such an impossible word as *bolun-màq* "to be become'd" it must be taken merely as the impersonal form (see Gram. p. 80, Syntax, § 14), like the French "on est devenu." Thus *kitáb-ni oqu'r bolundi* would be "one became (on est devenu) about to read the book (the book was about to be read)."
بوي	*bői* (subs.) height, stature, tallness, figure; *also* length (as of a river); *also* edge, margin; (sometimes used for the river or water-course itself).
بوياتماق	*boya-t-máq* (v. caus.) to cause to dye.

بو ياشماق *boya-'sh-máq* (v. recip.) to dye one another.

بو ياغ *boyá'gh* (subs. and adj.) dye ; *also* dyed [from *boya-máq*].

بو ياق *boyá'q, the same.*

بو ياقچي *boyá'q-chi* (subs.) a dyer.

بو ياماق *boya-máq* (v. tr.) to dye.

بو يداق *boïdák* (subs. and adj.) bachelor, unmarried, childless ; *also* (of a mare) not having foaled.

بويرا *boïra* (subs.) a reed matting, P.

بويراك *büirak* (subs.) kidneys, Kh.

بو يلاماق *bóï-la-máq* (v. tr.) to measure height, to go over head and ears into ; *also* to move along the length of any thing, "longer" Fr. (from *bóï*).

بو يلوق *bóï-luk* (adj.) tall, long.

بوين *bùyan* (subs.) neck.

بويورماق *buyur-máq* (v. tr.) to command, to order ; *also* used respectfully instead of *qelmáq* "to do" in compounds. Also (the optative *buyur-sun-lar)* in inviting any one to sit down, or to begin anything, like the Italian "favorisca."

بويوروق *buyur-uq* (subs.) a command, a "firmán."

بو يون *búyun* (subs.) neck.

بويونتوروق *búyun-tur-uq* (subs.) a yoke, a horse-collar, [from *búyun*, and verbal subs. (form *f*, see Gram. page 53) of verb *tur-máq*].

بويي *bóyi* (the definite or possessed form of *bóï*, which see).

بي *Bí* (subs.) a head-man among the Kirghiz.

بے بے *bíbí* (subs.) a lady, a woman (married).

بيدا *bédá* (subs.) lucerne grass (having purple flowers).

بيداو *bédao* (adj.) barren (used of women and mares) ; *also* of mixed breed.

بير *bir* (num.) one.

بيرار *birar* (adv.) singly, in one.

براشماك or بيراشماك *bir-ash-mak* for *bir-ish-mak* (v. recip.) to unite in giving.

بيراق *beráq* (subs.) a small flag *or* standard.

بيراو *birao* (subs.) a single one.

بيرلا *birla* (p. p.) with.

بيرلاتماک *bir-la-t-mak* (v. caus.) to cause to become of one accord, to reconcile, or bring together.

بيرلاشماك *bir-la-'sh-mak* (v. recip.) to agree together in one accord.

بيرلان *birlan* (p. p.) with. *See* برلان

بيرک *birk* (adj.) firm, strong, fast.

بيرکيتماک *birk-it-mak* (v. comp. tr.) to fasten, to make fast.

بيرکيتماك *birki't-mak* (v. caus.) to cause to be concealed.

بيرکيشماک *birki'sh-mak* (v. recip.) to conceal one another; *also* (*birk-ish-mak*) to confirm one another.

بيرکيلماک *birk-il-mak* (v. pass.) to be made fast.

بيرکينماک *birki'n-mak* (v. refl.) to conceal one's self.

بيرماک *bir-mak* [Y. *ber-mak*] (v. tr.) to give; [also much used in composition with other verbs, as: *koyup-birmak* 'to give over' to burning, *i. e.* to burn, Cf. Hind. *jalá déna.* With the Present Participle of another verb it implies beginning, e. g. *junaï birdi* "he began to go."

بيري *bíri* (adv.) on this side, on the hither side.

بيريکماک *bir-ik-mak* (v. intr.) to agree together, to become one.

بيز *biz* (pron.) we.

بيز *bíz* (subs.) a gland (especially as found in meat).

بيزاک *bézak* (subs.) adornment, finery.

بيزاکلانماک *bézak-la-'n-mak* (v. refl.) to adorn oneself.

بيزاکلاماك *bézak-la-mak* (v. tr.) to adorn, to beautify.

بيزدرماك *bez-dur-mak* (v. caus.) to cause to become wild.

بيزگاک *bezgak* (subs.) fever and ague.

بيزگالداك *bez-galdak* (subs.) a small black water-fowl, moor-hen.

بيزلار *biz-lar* (pron.) we [put into the plural form when several people are spoken of, to distinguish it from the (self-) respectful plural pronoun, *biz*, (we), used of a single person].

بيزماك *bez-mak* (v. intr.) to become wild, to cease frequenting (a place).

بيش *bésh* (num.) five.

بيشار *bésh-ar* (adv.) by fives.

بيشنچي *bésh-inji* (adj.) fifth.

بيشاو *bésh-ao* (subs.) a group of five, a five.

بيشاولان *béshaolan* (subs.) a five, all the five, KH. KAZ.

بيشايلان *béshaïlan* (subs.) *the same.*

بيشيك *béshik* (subs.) a cradle.

بيقسم *béqasam* (subs.) a sort of striped silk stuff made in Bokhára, Khojand, Margilan, &c.

بيك *bek* (adv.) strongly, very [for *birk*].

بيگ *Bég* (subs.) a chief, a governor.

بيگچيليك *bég-chi-lik* (subs.) rule, chieftainship.

بيگ ليك *béglik* (adj) belonging to the chief.

بيكچ *bêkach* (subs.) the daughter of a Beg, or notable, KAZ.

بيگم *bégim* (subs.) the wife of a Beg [also *beg-im* "my Beg"].

بيكه *békah* (subs.) *the same as* bêkach, KAZ.

بيكيتماك *bik-it-mak* (v. caus.) *for* birkitmak, *which see.*

بيگيز *bigiz* (subs.) an awl.

بيكيلماك *bik-il-mak* (v. pass.) *for* birkilmak.

بيكينماك *bik-in-mak* (v. refl.) *for* birkinmak.

بيل *bil* (subs.) a man's waist.

بيل *bel* (subs.) a shovel, P.

بيلازوك *bilàzuk* (subs.) the wrist; *also* a wristlet, a bracelet, a handcuff, [*see* بلازوک].

بيلاك *bilak* (subs.) a man's fore-arm.

بيلاتماك *bila-t-mak* (v. caus.) to cause to sharpen.

بيلاشماك *bila-'sh-mak* (v. recip.) to sharpen in company.

بيلاماك *bila-mak* (v. tr.) to sharpen, to whet.

بيلان *bilàn* (post-pos.) with [same as *bir-lan*].

بيلاور *bilaor* (subs.) crystal, P.

بيلاو *bilao*
بيلاي *bilaï* (subs.) a whet-stone, a hone.

بيلباغ *bil-bágh* (subs.) a girdle, a waist-band, a waist-sash
بيلباق *bil-báq* [from *bil* and *bágh-la-maq*].

بيلدورماك *bil-dur-mak* (v. caus.) to cause to know, to explain.

بیلقیلداتماق *bilqilda-t-máq* (v. caus.) to cause to quake.

بیلقیلداشماق *bilqilda-'sh-máq* (v. recip.) to quake together.

بیلقیلداماق *bilqildá-máq* (v. intr.) to quake [as a bog or a moss].

بیلقیلداق *bilqildàq* (subs.) a quaking bog ; *also* a kind of red composition used for rings, buttons, &c., which gives to th touch.

بیلگو *bil-gü* (vl. subs.) a mark, an indication, a badge [the future participle of *bil-mak*].

بیلماك *bil-mak* (v. tr.) to know, to understand ; *also* to think.

بیلّا *billah* (adv.) together, in company.

بیله *bilah* (post-pos.) with.

بیلیک *bil-ik* (vl. subs.) knowledge ; *also* wisdom, [from *bil-mak*].

بیلیک‌لیک *bil-ik-lik* (vl. adj.) knowing, acquainted with [from *bil-mak*].

بییوك *biyuk* (adj.) high, elevated, Kh. Kaz.

بییه *bíyah* (subs.) a mare which has a foal.

پ

پاپي *pàpi* (subs.) a deformed dwarf whose head and trunk are of natural size.

پات *pât* (adv.) quickly [also *fát*].

پاتاقي *patàqi* (subs.) a percussion cap, P.

پاتراق *pàt-ráq* (adv.) more quickly.

پاتقاق *pàtqáq* (subs. and adj.) a quagmire ; *also* muddy, miry.

پاتمان *pàtman* (subs.) a weight of 64 *cháraks*.

پاتنگان *patingan* (subs.) a vegetable, the "brinjal."

پاتوق *pàtuk*
پاتیق *pàtik* (subs. and adj.) a quagmire ; miry.

پاچا *pácha* (subs.) the leg below the knee.

پاچاق *pàcháq* (subs.) the leg of an animal.

پاچاق *pacháq* (subs. and adj.) a dent in a metal kettle or saucepan ; *also* dented.

پاختا *pàkhta* (subs.) cotton-wool (cleaned of seeds).

پاختک	*pakhtak* (subs.) a dove, *from* P.
پارا	*pára* (subs.) a bribe, P.
پارابیرماگ	*pára-birmak* (v. comp.) to bribe.
پارایماک	*pára-yémak* (v. comp.) to be bribed, *lit.* to eat bribes.
پارچه	*parcha* (subs.) a piece, P.
پارچالاتماق	*parcha-la-t-máq* (v. tr.) to cause to put in pieces.
پارچالاشماق	*parcha-la-'sh-máq* (v. recip.) to sub-divide together.
پارچالاماق	*parcha-la-máq* (v. tr.) to put in pieces, to sub-divide.
پاقا	*pàqà* (subs.) a frog (see *baka*).
پاقا چاناق	*pàqà-chanáq* (subs.) a tortoise (see ***baqa-chanáq***).
پاقالچاق	*paqàlcháq, the same as* baqalchaq.
پاقتا	*páqta, the same as* pakhta.
پاك	*pàk* (adj.) clean, P.
پاکلانماك	*pàk-la-'n-mak* (v. refl.) to clean one's self, P. T.
پاکلاماك	*pàk-la-mak* (v. tr.) to clean, P. T.
پاكي	*paki* (subs.) a razor.
پاكي پیچاق	*paki-picháq*, (subs.) a pen-knife.
پالاس	*pàlàs* (subs.) woollen matting.
پالان	*pálán* (subs.) a pack-saddle, P.
پالو	*palao* (subs.) a dish of rice and meat, "pilaw," P.
پالتو	*páltu* } (subs.) an axe, a hatchet.
پالدو	*páldu*
پالوان	*pàlwân* (subs.) a strong man, an athlete, a wrestler; *also* a good sportsman; [*from* pahlwân, P.]
پایلا تماق	*paï-la-t-máq* (v. caus.) to cause to keep watch, to cause to mount guard.
پایلا شماق	*paï-lash-máq* (v. recip.) to mount guard together.
پایلاماق	*paï-la-máq* (v. tr.) to mount guard.
پایلاي	*pailaï* (subs.) a leather gauntlet for carrying hawks, &c.
پختة	*pakhta, see* pâkhta.
پختة	*pukhta* (adj.) experienced, careful, P.
پرتال	*partál* (subs.) a horse laden with personal necessaries, (? P.).

پس *pas* (adv.) behind; *also* (adj.) for *past*, low, inferior, mean, base, P.

پستہ *pista* (subs.) a pistachio nut.

پستہ *pista* (subs.) a terrier, a small Chinese pug, any small dog.

پسکنہ *pas-kanah* (adj.) little and mean, base, dirty [*past*, with diminutive affix *kana* or *ghina*], P. T.

پسکونہ *pas-kunah, the same as* pas-kanah.

پسلاماک *pas-la-mak* (v. tr.) to abate, to diminish, P. T.

پو پوک *pupuk* (subs.) a tassel.

پو پوکچي *pupuk-chi* (subs.) a tassel-maker.

پوت *put* (subs.) leg, foot [also *fut*].

پوتاق *putáq* (subs.) a branch, a twig.

پوتتور ماک *püt-tür-mak* (v. caus.) to cause to trust; 2, to cause to write.

پوتماک *püt-mak* (v. tr.) to trust, to believe; 2. to finish, to accomplish; 3. also for *pit-mak* (which see).

پوتوشماک *püt-üsh-mak* (v. recip.) to trust one-another; 2. to write to one another.

پوتوماک *pütü-mak* (v. tr.) to write [for *pit-mak*].

پوتون *pütün* (adj.) complete, entire.

پوج *püch* (adj.) empty, without kernel; stupid, empty-headed.

پوچاق *pucháq* (subs.) the rind (of a fruit).

پوچاک *pūchak* (adj.) empty, without kernel (used of nuts, &c.).

پوچقاق *puchqáq* (subs.) the leg-skin of a fox, wolf, &c., of which fur-robes are made.

پوچوق *puchuq* (subs. and adj.) a noseless man; noseless, snub-nosed.

پوخراتماق *pukhra-t-máq* (v. caus.) to cause to sneeze [used of flies teasing a horse's nose].

پوخراشماق *pukhra-'sh-máq* (v. recip.) to sneeze together, [when the horses of a Kazzak expedition do this it is considered a bad omen].

پوخراماق *pukhra-máq* (v. intr.) to sneeze (used of a horse or camel).

پور *pur* (adj.) rotten, unsound.

پورداق *purdáq* (subs.) fat, Y.

پواچاق	*purcháq* (subs.) peas.
پورخوراتماق	*purkhura-t-máq*, see *pukhrat-máq*.
پورخور آشماق	*purkhura-'sh-máq*, see *pukhrash-máq*.
پورخوراماق	*purkhura-máq*, see *pukhra-máq*.
پوستاک	*postak* (subs.) a fur mat, P. T.
پوستین	*postin* (subs.) a fur robe, P.
پوسدونبه	*pos-dumba* (subs.) the fat of the "dumba" sheep's tail together with its skin (which is all eaten) [corr. from *post-i-dumba*, P.]
پوش پوش	*posh-posh* (interj.) used in clearing the road for a great man [? from *poshidan*, "to hide,"] P.
پوشانگ	*pushang* (subs.) a lever [especially one used for raising a mill-stone].
پوشماق	*push-máq* (v. intr.) to be melancholy or disturbed in mind.
پوشماک	*püsh-mak* (v. intr.) to become cooked; to ripen.
پوشورماق	*push-ur-máq* (v. caus.) to cause to become melancholy, to vex.
پوشورماک	*püsh-ür-mak* (v. caus.) to cause to become cooked, to cook (tr.); to cause to ripen.
پوشونماق	*push-un-máq* (v. refl.) to vex one's self.
پوق	*puk* (subs.) excrement, dung.
پوقاق	*puqáq* (subs.) a goître.
پوک	*puk* (adj.) hollow, empty (used of fruit, &c.).
پوکیلداتماک	*pukilda-t-mak* (v. caus.) to cause to sound hollow (by tapping or stamping, &c.)
پوکیلداماک	*pukilda-mak* (v. intr.) to sound hollow, to give a hollow sound.
پول	*pul* (subs.) a copper coin [the fiftieth part of a *tanga* which = 5 pence, about]; *also* money in general, P.
پوللوق	*pul-luq* (adj.) costing money, dear, expensive; possessed of money, rich, P. T.
پیاله	*piálah* (subs.) a cup, *also vulg. used for* glass, as *piálah-aïna*, "looking-glass," P.
بیت	*pit* (subs.) a louse.

پیتکوچی *pit-ku-chi* (v. subs.) a writer (used only of the manual labour of writing).

پیتماک *pit-mak* (v. tr.) to write.

پیتور ماک *pit-tur-mak* (v. caus.) to cause to write.

پیتیك *pit-ik* (v. subs.) a writing.

پیچاق *pichàq* (subs.) a knife (vl. subs. from *pich-mak*).

پیچاک *pîchak* (subs.) a creeper, a plant which runs up trees and dies down in winter.

پیچان *pichan* (subs.) hay, any dried fodder.

پیچتورماک *pich-tur-mak* (v. caus.) to cause to cut out.

پیچیشماک *pich-ish-mak* (v. recip.) to cut out in company.

پیچماک *pich-mak* (v. tr.) to cut out any stuff to make a garment, &c.; to carve.

پیس *pis* (subs. and adj.) spotted with leprosy; *also* of animals with a similar appearance, Kh.

پیسه *pisah* (subs. and adj.) *The same.*

پیگه *pega* or *peiga* (subs.) a horse-race (generally over many miles of distance).

پیلته *piltah* (subs.) the match of a match-lock gun, the cotton wick of a candle or lamp, P.

پیلله *pilla* (subs.) a cocoon (of the silk-worm).

پیلیک *pilik* (subs.) a candle-wick.

پیمان *païmàn* (subs.) a bushel, a measured (not weighed) quantity of grain, &c. [see next].

پیمانه *païmànah* (subs.) a bushel, a measure of capacity (varying in size), P.

ت

تابا *taba* (subs.) a flat iron pan for cooking, P.

تاباق *tabâq* (subs.) a dish, A.

تاپان *tapan* (subs.) the sole of the foot.

تاپتورماق *tàp-tur-mâq* (v. caus.) to cause to find, to cause to produce.

تاپشماق *tàp-ish-màq* (v. recip.) to find one-another, to meet; to marry one-another without the intervention of friends or agents.

تاپشورماق *tàp-shur-màq* (v. caus.) to cause to receive, *viz.* to entrust, to put under any-one's charge.

تاپقوچي *tàp-qu-chi* (subs.) a finder.

تابلاتماق *tab-la-'t-màq* (v. tr.) to cause to twist (cloth or rope), to cause to wring.

تابلاشماق *tab-la-'sh-màq* (v. recip.) to twist ropes in company [takes four men, three at one end to twist the strands, and one man at the other end to twist the united rope].

تابلاماق *tab-la-màq* (v. tr.) to twist, to twine, to wring.

تاپماق *tàp-màq* (v. intr.) to find, to meet with; to receive, to obtain.

تاپوش *tàp-ush* (v. subs.) findings, earnings, gain [from *tàp-màq*]·

تاپوق *tàp-uq* (v. subs.) winnings (at play) [from *tàp-màq*).

تاپونماق *tàpu'n-màq* (v. refl.) to worship [? from obsolete *tàpu-màq* "to serve"] *quasi* to serve by one's own life.

تاتالاماق *tata-la-màq* (v. tr.) to scatch or tear with the nails or claws.

تاتليغ *tat-ligh* }
تاتليق *tat-liq* } (adj.) tasty, savoury, sweet.

تاتماق *tât-màq* (v. tr.) *for* tàrt-màq (which see).

تاتيتماق *tàt-i't-màq* (v. caus.) to cause to taste.

تاتيشماق *tàt-i-'sh-màq* (v. caus.) to taste together.

تاتيماق *tàt-i-màq* (v. tr.) to taste.

تاجي خوراز *tàj-i-khuràz* (subs.) *lit.* a cock's comb: the name of a plant, (? "Prince's feather"), corr. P.

تاجيک *Tâjik* (pr. name) the existing original Arian (Iranian) population of Western Central Asia, and their language; (opposed to *Turk* as '*Arab* is to '*Ajam*).

تاختا *takhta* (subs.) a plank, a board, a shelf, P.

تار *târ* (adj.) tight, close, confined, narrow.

تاراتماق *tara-t-màq* (v. tr.) 1. *For* tarqa-'-t-màq (which see). 2. To cause to comb [from *tara-màq*], Kaz.

تاراشماق *tara-'sh-màq* (v. recip.) 1. *For* tarqa-'sh-màq, Kaz. 2. To comb one's hair together, or for one-another.

تاراشه *taràshah* (subs.) a chip, a shaving; *also* a broad piece of wood used for punishing people by the Chinese, P.

تاراق *târâq* (subs.) a comb.

تارالماق *tara-'l-mâq* (v. pass.). *For* tarqa-'l-màq, Kaz.

تارام *taram* (subs.) a divarication, or branching off of one stream into many (as in a broad flat bed or in a delta). [? The name Tarim-gol for the River of Eastern Turkistán may be derived from this word, as it would express the characteristic of that River better than the word *tarim* = cultivated].

تاراماق *tara-màq* (v. tr.). 1. *For* tarqa-màq, Kaz. 2. To comb.

تاران *taran* (subs.) a root used in tanning.

تارانچي *tara-'nchi* (subs.) 1. a cultivator; 2. also the proper name applied to the Turki colonists in the country of Ila (Kulja), [from *tari-màq*].

تاربوز *tarbuz* (subs.) a water-melon, P.

تاربوغوز *târ-bughuz* (subs.) a gorge, the entrance to a ravine; *lit.* "narrow-throat" (see the words).

تارپي *tarpi* (subs.) carrion.

تارتشماق *tart-ish-màq* (v. recip.) to pull against one-another (to "play French and English").

تارتماق *tart-màq* (v. tr.) to draw, to pull; *also* to draw lines or figures; to draw out; to lead out (an army); to weigh.

تارتوق *tartuq* (subs.) tribute; the yearly offerings made by a local governor, &c. to his superior chief (so called because *drawn out*, as it were, from the country).

تاراراق *tàr-ràq* (adj. comp.) narrower, more tight.

تارقاتماق *tarqa-'t-màq* (v. caus.) to cause to disperse.

تارقاشماق *tarqa-'sh-màq* (v. recip.) to scatter one's-selves apart, to depart from one another.

تارقالماق *tarqa-'l-màq* (v. pass.) to be scattered.

تارقاماق *tarqa-màq* (v. intr.) to disperse, to scatter.

تارليق *tàr-liq* (subs.) narrowness, tightness.

تاري *tari*, Kaz.

تاريغ *tarigh* } millet.

تاريق *tariq*

تاريلگو *tari-'l-gu* (v. adj.) cultivable.

تاريم *tarim* (adj.) cultivated, that has been cultivated.

تاريماق *tari-màq* (v. tr.) to cultivate.

تاز *tâz* (subs.) scald-head, 'Impetigo capitis.'

تازا *tàza* (adj.) fresh, new, in good condition, strong, P.

تازلاتماق *tâza-la-'t-màq* (v. caus.) to cause to renew, &c.

تازلاشماق *tàza-la-'sh-màq* (v. recip.) to renew or mend, or clean, in company.

تازلاماق *tàza-la-màq* (v. tr.) to renew, to mend, to strengthen.

تازغون *tàzghun* (subs.) a stream, a flood. [Specially applied as the proper name of a River and district 14 miles south of Kàshghar.]

تازي *tàzi* (subs.) a greyhound, P.

تاش *tâsh* (subs.) a stone, (also a stone used for weighing), a mile-stone [the distance indicated is also called *sang* (=stone, P.) or *farsakh*, A. and is nominally 12,000 paces or about 5 miles.]

تاش *tàsh* (subs. and adj.) the outside, outside.

تاشايورت *tàsha-yurt* (comp. subs.) foreign country, *lit.* outside country.

تاشقاري *tàsh-q'-ari* (adv.) outside. [See Gram. p. 65 and ff.]

تاشقون *tàsh-qun* (subs.) a flood in a stream.

تاشلاتماق *tàsh-la-'t-màq* (v. caus.) to cause to throw.

تاشلاشماق *tàsh-la-'sh-màq* (v. recip.) to throw at one another, to throw together, to stone.

تاشلاماق *tàsh-la-màq* (v. tr.) 1. to throw, to throw away, *met.* to abandon, to reject (qu. from *tàsh*, a stone as a missile) 2. to put outside, *viz.*, to line, to cover.

تاشليق *tàsh-liq* (adj.) stony.

تاشليق *tàsh-liq* (subs.) the outer covering of a cap, or of a fur robe, or of a mattrass, &c.

تاشماق *tàsh-màq* (v. intr.) to overflow the brim, to boil over, to surge over.

تاش ياني *tàsh-yàni* [short for *tàsh-ning yàn-i*] (subs.) the outside.

تاشيق *tàsh-iq* (vl. subs.) an overflow, a boiling over, a flood.

تاشيماق *tashi-màq* (v. tr.) to transport by repeated efforts, (as ants carrying away grain).

تاغ *tàgh* } (subs.) a mountain, a mountain chain.
تاق *tàq* }

تاغا *tagha* (subs.) a relation by the mother's side.

تاغار *taghar* (subs.) a bag, a sack.

تاق *tàq* (subs.) a single one, an odd number (opposed to *juft*, P. "pair" or "even").

تاقا *taqa* (subs.) a horse-shoe ; an odd article (out of pair).

تاقاشماق *taqa-'sh-màq* (v. recip.) to strike or press against one-another (qu. for *toqush-màq* which see) ; to oppress any one with much talking, to bore.

تاقتا *taqta* (subs.) *For* takhta.

تاقتورماق *tàq-tur-màq* (v. caus.) to cause to hang anything on to a person or animal.

تاقچا *tàq-cha* (subs.) a shelf formed by a recess in a wall.

تاقماق *tàq-màq* (v. tr.) to hang anything on to a person or animal, (as a charm or a locket).

تاقور *taqur* (subs.) a desert whose soil is hard and smooth. KAZ.

تاقوشماق *taq-'ush-màq* (v. recip.) to hang things on to one another's person.

تاک *tâk* (subs.) a vine, KH.

تاکا *taka* (subs.) a buck goat, a buck antelope.

تال *tâl* (subs.) 1. a willow, KH. ; 2. a vine ; 3. (? for *tàr* P.) a single one of any long objects, e. g. بر تال موي "a single hair," برتال اوق "a single arrow."

تالادا *talada* (adv.) out of doors.

تال تال *tâl-tâl* (adj.) bushy, full (used of a woman's hair, or a horse's tail, or of fringe).

تالا تماق	*tala-'t-maq* (v. caus.) to cause to pillage.
تالا شتور ماق	*tala-'sh-tur-maq* (v. recip. caus.) to set a fighting (of dogs).
تالا شماق	*tala-'sh-maq* (v. recip.) lit. to rob one-another, to fight together (of dogs, &c.).
تالا ماق	*tala-maq* (v. tr.) to pillage, to rob; to fight (of animals).
تالان	*talan* (subs.) pillage, a pillaging.
تالانماق	*tala-'n-maq* (v. pass.) to be pillaged.
تالاو	*talao* (subs.) a fatal illness of horses, KAZ.
تالپونماق	*talpun-mâq* (v. intr.) to flutter, to struggle.
تالقان	*talqan* (subs.) parched grain ground into flour. Hindi, '*sattu.*'
تام	*tàm* (subs.) a wall.
تاماق	*tamaq* (subs.) the throat; also food (ready for eating).
تامبال تامبان	*tambal* *tamban* } (subs.) trousers, drawers, P.
تامچي	*tam-chi* (subs.) drippings, water oozing through the roof and falling by drops.
تامچي	*tàm-chi* (subs.) a wall-builder, a mason, [from *tam-maq*].
تامدورماق	*tam-dur-maq* (v. caus.) to cause to drip, to pour out by drops.
تامغان	*tamghan* (subs.) a branding iron.
تامماق	*tam-màq* (v. intr.) to drip, to fall by drops.
تامور	*tamür* (subs.) the pulse.
تاموغ تاموق	*tamugh* *tamuq* } (subs.) hell.
تاميتماق	*tam-it-maq* (v. caus.) to cause to drip. The same as *tam-dur-mak*.
تانا	*tana* (subs.) a heifer or young bull, (a calf in the second year).
تاندورماق	*tân-dur-maq* (v. caus.) to cause to deny.
تانسوق	*tânsuq* (subs.) a longing, a desire.
تانسوقلاماق	*tansuq-la-maq* (v. tr.) to long for.
تانگ	*tâng* (subs.) dawn, daybreak.

تانگ *tâng* (interj.) an exclamation implying astonishment; "you don't say so!" or "indeed."

تانگ آتماق *tâng-ât-maq* (v. comp. intr.) to dawn, to break (said of the day) [from *tang* "dawn," and *ât-maq* "to shoot;" with reference to the rays of light].

تانگ دررماق *tâng-dur-maq* (v. caus.) to cause to bind.

تانگسوق *tangsuq* (subs.). The same as *tansuq*.

تانگغه قالماق *tâng-gha-qâl-mâq* (v. comp intr) to remain in astonishment, to be amazed.

تانگلا *tângla* (subs.) to-morrow, the morrow; 2. a large wooden vessel for washing clothes, and mixing dough in.

تانگلا تماق *tâng-la-'t-maq* (v. caus.) to cause to select, to offer to the choice.

تانگلاشماق *tâng-la-'sh-maq* (v. recip.) 1. to select in company; 2. to be astonished.

تانگلاماق *tâng-la-maq* (v. tr.) to choose out, to select.

تانگماق *tâng-maq* (v. tr.) to bind a bundle, or any inanimate things, also a broken limb.

تانماق *tan-maq* (v. intr.) to give denial to [takes *ga* after the thing denied].

تانوق *tanük* (v. subs.) recognition.

تانوقلوق *tanüq-luq* (v. adj.) recognised (from following).

تانوماق *tânü-maq* (v. tr.) to recognise.

تانوشماق *tânü-'sh-maq* (v. recip.) to recognise one another.

تانیشماق *tan-ish-maq* (v. recip.) to deny one another, or to one another.

تانیغلیق *tan-igh-liq* (v. adj.) denied.

تانیماق *tâni-maq* (v. tr.). The same as *tanü-maq*.

تاو *tâo* (subs.). The same as *tagh*, Kaz.

تاوا *tâwa* (subs.) a shallow pan for cooking in.

تاوالاتماق *tawa-la-'t-maq* (v. caus.) to cause to cry out.

تاوالاشماق *tawa-la-'sh-maq* (v. recip.) to clamour or scold at one another.

تاوالاماق *tawa-la-maq* (v. intr.) to clamour, to cry out.

تاوشقان	*taushqan* (subs.) a hare.
تاوق	*tâuq* (subs.) a fowl.
تاولاتماق	*tâu-la-'t-maq* (v. caus.). The same as *tab-la-'t-maq.*
تاولاشماق	*tâu-la-'sh-maq* (v. rec.). Same as *tab-la-'sh-maq.*
تاولاماق	*tâu-la-maq* (v. tr.). Same as *tab-la-maq.*
تای	*taï* (subs.) a young horse in the second year.
تایا تایا	*taya-taya* (pres. part.) slipping and sliding [pron. *taï-maq*].
تایاق	*tây-âq* (subs.) a walking-stick.
تای خر	*taï-khar* (subs.) a young donkey, T. P.
تایغاق	*taï-ghak* (adj.) slippery; also given to slipping.
تایغان	*taï-ghan* (subs.) a greyhound.
تایلاق	*taï-laq* (subs.) a young camel (in the 2nd year).
تایماق	*taï-maq* (v. intr.) to slip, to slide.
تاینچا	*taï-ncha* (subs.) a heifer in the 2nd year, KAZ.
تایوشماق	*tay-üsh-maq* (v. recip.) to slide together, to amuse oneself by sliding on ice, or by sliding down a kind of "Montagne Russe."
تبراتماك	*tibra-'t-mak* (v. caus.) to cause to shake, to cause to remove itself.
تبراشماك	*tibra-'sh-mak* (v. recip.) to shake together.
تبراماك	*tibra-mak* (v. intr.) to shake, to move.
تبرانماك	*tibra-'n-mak* (v. recip.) to move, or shake, oneself.
تبیت	*tübit* [pron. *tibit*] (subs.) the down of the shawl-goat, [of which the finest in the world comes from Turfân].
تدراتماک	*titra-'t-mak* (v. caus.) to tremble.
تترا شماك	*titra-'sh-mak* (v. recip.) to tremble together.
تتراماك	*titra-mak* (v. intr.) to tremble, to quake, to shiver.
تخي	*takhi* (conj.) moreover, further, again.
تراك	*türak* [pron. *trek*] (subs.) a prop, a support.
ترساك	*türsak* [pron. *tirsak*] (subs.) the elbow.
تریک	*türik* [pron. *trik*] (adj.) alive.
تریک لیک	*türik-lik* (subs.) life.

تز	*tüz* [pron. *tiz*] (subs.) knee.
تزا	*taza* (subs.) knee.
تزالاتماک	*taza-la-'t-mak* (v. caus.) to cause to kneel.
تزالاشماك	*taza-la-'sh-mak* (v. recip.) to kneel opposite one another.
تزالاماك	*taza-la-mak* (v. intr.) to kneel.
تزالانماك	*taza-la-'n-mak* (v. refl.) to seat one's self in a kneeling position (sitting back on one's heels, the usual Turki sitting posture).
تزماک	*taz-mak* (v. tr.) to Tange (things) in line.
تس	*tas* or *tis* (adv.) with difficulty, hardly.
تش	*tüsh* [pron. *tish*] (subs.) tooth.
تشاتماک	*tüsh-a-'t-mak* (v. caus.) to cause to renew the teeth, specially to file the teeth of a saw.
تشاماک	*tüsh-a-mak* (v. intr.) to change the teeth, to cut a fresh set of teeth (both of men and animals).
تشتاک	*tashtak* (subs.) an earthen vessel, KASHGHAR.
تقصير	*taqsir* (interj.) lit. fault "culpa mea," A.; but used as a term of respect to a great man, equivalent to "Your Excellency," "Your Highness" (as if to excuse one's self beforehand for addressing a person of such dignity).
تقي	*taqi* (adv.) moreover. The same as *takhi*.
تکان	*tükan* [*tikan*] (subs.) a thorn.
تکتورماک	*tük-tur-mak* [*tik-tur-mak*] (v. caus.) to cause to sew, &c.
تکلاتماک	*tük-la-'t-mak* (v. caus.) to cause to set upright.
تکلاشماک	*tük-la-'sh-mak* (v. recip.) to join together in setting upright.
تکلاماک	*tük-la-mak* (v. tr.) to raise any long object into a vertical position, to set upright [see *tiklamak*].
تکلانماک	*tük-il-an-mak* (v. pass. refl.) [from *tük-il-mak*] to stare at [governs *gha*].
تکماک	*tük-mak* [*tik-mak*] (v. tr.) to sew, to fasten, to fix, to plant; to stake (at play).
تکیشماک	*tük-ish-mak* [*tik-ish-mak*] (v. recip.) to sew together, &c.

تکیلماک *tük-il-mak* [*tik-il-mak*] (v. pass.) to be sewn, &c., *also* to have one's eyes fixed on any thing, to stare [cf. "fixer," Fr.]

تگ *tag* (subs.) bottom [*tag-ida* "beneath"].

تل *tül* [*til*] (subs.) tongue ; *also* language.

تالاتماک *tül* [*til*]-*la-'t-mak* (v. caus.) to cause to vituperate.

تللاشماک *tül* [*til*]-*la-'sh-mak* (v. recip.) to scold or abuse one another.

تلاك *tülak* [*tilak*] (v. subs) an earnest desire, a prayer, [from *tilamak*].

تلاق *talaq* (subs.) the supra-renal capsule [a gland situated above the kidneys].

تللاماک *tül* [*til*]-*la-mak* (v. tr.) to scold or abuse, to "give the rough side of one's tongue" [from *tūl*].

تلاماک *tüla-mak* [*tila-mak*] (v. tr.) to desire, to wish for ; *also* to request, to ask for.

تلپک *tilpak* (subs.) a fur cap, with a covering of cloth or silk, and fur edging round the head.

تلفک *tilfak* (subs.). The same as *tilpak*.

تماق *tümak* (subs.) a fur cap extending down over the ears.

تمان *tuman* (num.) ten thousand.

تمغاق *tamghâq* (subs.) the fur of the throat of a lynx, fox, &c. [being fine, robes are made of a collection of such furs].

تمغه *tamgha* (subs.) a branding iron.

تنج *tünj* [*tinj*] (adj.) happy, at ease.

تنجي ليق *tünji-liq* [*tinj-liq*] happiness.

تندە *tandah* (subs.) a long thread prepared for the warp of a stuff to be woven, P.

تندور *tandur* (subs.) an oven, P.

تنکار *tana-kâr* (subs.) borax, P.

تنگ *tang* (subs.) a girth, P.

تنگري *tangri* (subs.) God. [Little used in Yarkand, &c.]

تنگلاماک *tang-la-mak* (v. tr.) to present, to offer, Y.

تنگه *tangah* (subs.) a money of account used in Turkistán, consisting of 25 small copper "cash" (of Chinese make with square holes though them) called *dahchán*, each of which is worth two *pul* (imaginary coin). The value of the *tangah* varies constantly in the bazárs according to the number of *tangah* that may be given for a *kurs* (a Chinese silver ingot weighing about 2 lbs., and worth about 170 Rupees). Sometimes the number reaches 1100 and sometimes falls as low as 800. The Amir of Kâshghar has lately supplied the lack of small silver coinage, by issuing silver coins worth a *tangah* each, and called *ak-tangah* (white tangahs) after the model of the Khokand and Bokhâra coins so-called, but in the name of the Sultàn of Turkey; they are current at a small premium. The Khosan *tangah* consists of 50 copper *shu-chan*, which are only slightly smaller than the Yarkand *dah-chan*. Consequently a Khosan *tangah* is worth nearly twice as much as a Yarkand or Kashghar one.

The word *tangah* is also used for the 'scales' of a fish.

تنور *tanur* (subs.) an oven, P.

تنیده *tanidah* (subs.) Same as *tandah*, P.

توا *tuwa* (subs.) a two-humped camel [the sort more usual in East Turkistân], KIRGHIZ.

تواق *tuwâq* (subs.) a lid, cover of a saucepan.

تواق *tuwâq* (subs.) a hoof [same as *tuyaq*].

توب *tüb* (subs.) a root (used also in counting trees; as *öch tüb darakht* "three trees"); *also* the bottom of anything. [Used as a comp. post-pos.; e. g., *kazan-ning tüb-i-da* "in the bottom of the saucepan]."

توبان *tüban* (subs.) a low place [chiefly, as a post-pos. in comp.; *e. g.*, *din tuban* or *ning tuban-i-da* "below;" also as an adv. absolutely].

توبانراک	*tüban-rák* (adv.) more below. *Also* (post-pos.) *din tuban-rák* " lower than."
توبانلاش	*tüban-lash* (adv.) downwards.
توبروک	*tübürük* [*tübrük*] (subs.) a pillar or prop supporting the ceiling of a room.
توبورک	*tuburuk.* (subs.). The same as *tubruk.*
توپ	*top* (subs.) a cannon.
توپ	*tòp* (subs.) a definite quantity (of anything); *e. g.*, a 'piece' of cloth, a 'herd' of cattle, &c.
توپ	*tôp* (subs.) a ball used by children for playing.
توپا	*topa* (subs.) earth, dust.
توباق	*tobáq* (subs.) the cover of a saucepan.
توپالاتماک	*topa-la-'t-mak* (v. caus.) to cause to heap up.
توپالاشماک	*topa-la-'sh-mak* (v. recip.) to heap up together.
توپالاماک	*topa-la-mak* (v. tr.) to heap up (as grain in a measure).
توپچاق	*topcháq* (adj.) long-necked like a Turkman horse (used of horses).
توپچی	*top-chi* (subs.) an artillery man, a gunner.
توپچی	*top-chi* (subs.) a row of buttons on the breast of a robe.
توپه	*tupah* (subs.) the top, also height [used as a comp. post-pos.; *e. g.*, *tagh-ning tupa-si-da* on the top of the mountain].
توپورماک	*tupur-mak* (v. tr.) to spit, to spit out.
توپوروک	*tupuruk* (subs.) spittle, saliva.
توپی	*topi* (subs.) a skull-cap.
توت	*tut* (subs.) mulberry, P.
توتاش	*tut-ash* (adj.) touching, contiguous.
توتاشتورماق	*tut-ash-tur-maq* (v. recip. caus.) to cause to ignite.
توتاشماق	*tut-ash-maq* (v. recip.) to lay hold of, to kindle, to ignite [used only of fire; and governs *gha*].
توتام	*tut-am* (subs.) a measure of length, the length covered by the clenched hand, a " hand."
توتاملاتماق	*tut-am-la-'t-maq* (v. tr.) to cause to measure by noting the successive lengths covered by the hand grasping the object.

توتاملاشماق	*tut-am-la-'sh-maq* (v. recip.) to compare measurements thus taken.
توتاملاماق	*tut-am-la-maq* (v. tr.) to measure by grasping in the fist.
توتقون	*tut-qun* (subs.) captivity.
توتلوقماق	*tut-luq-maq* (v. intr.) to stutter.
توتماق	*tut-maq* (v. tr.) to grasp, to seize, to take.
توتوشتورماق	*tut-ush-tur-maq* (v. rec. caus.) to cause to grasp one-another; *viz.* to cause to wrestle.
توتوشماق	*tut-ush-maq* (v. recip.) to grasp one another, to wrestle.
توتولماق	*tut-ul-maq* (v. pass.) to be seized; *also* to be eclipsed (of the sun and moon).
توتون	*tutun* (subs.) smoke.
توتونماق	*tut-un-maq* (v. refl.) to be seized with astonishment.
توتي	*toti* (subs.) a pony, a small baggage horse.
توتي	*toti* (subs.) a parrot, P.
توچ	*tuch* (subs.) brass.
توچکورتماک	*tuch-kur-'t-mak* (v. caus.) to cause to sneeze.
توچکوروشماک	*tuchkur-ush-mak* (v. recip.) to sneeze together.
توچکورماک	*tuchkur-mak* (v. intr.) to sneeze.
توچکوروک	*tuchkur-uk* (v. subs.) a sneeze.
توختاتماق	*tokhta-'t-maq* (v. caus) to cause to stop.
توختاشماق	*tokhta-'sh-maq* (v. recip.) to stop together.
توختاماق	*tokhta-maq* (v. intr.) to stop, to halt.
توخماق	*tokhmaq* (subs.) a mallet. *For* toqmaq.
توخو	*tokhü* (subs.) a fowl.
توخوم	*tokhum* (subs.) an egg, a seed.
توخوماک	*tokhumak* (subs.) a seed used in dyeing (yellow and red).
توخي	*tokhi* (subs.) a fowl.
تور	*tur* (subs.) a net, P.
تور	*tur* (subs.) the place of honour (in a company, &c.).
تورا	*tura* (subs.) a Chief (among the Kalmâks); a Prince, a descendant of an independent sovereign, or of the

Prophet (sometimes). Amir Timur in his Autobiography applies the term to the descendants of Chingiz Khan, the then sovereign house. The family, which almost exclusively enjoys the title in Eastern Turkistân, is that derived from *Makhdum A'zim*, an eminent Sâyad and saint of Western Turkistân who, in the 16th century of our era, married a Kashgharian lady, a descendant of *Satuq Bughra Khan* [one of the early kings of Kâshghar said to be of the race of Afrasiab, and whose descendants ruled till they were displaced by the Kara-Khatai power of the Gurkhân]. The family of Makhdum A'zim held sway in East Turki chiefly by virtue of the religious veneration felt for them, till they were ousted by the Chinese in the middle of last century, and have since made many attempts to regain it. (They are also termed "Khwaja" (pron. *Khoja*) which is the term applied to the offspring between a Sâyad and a woman of any other family who are not Sâyads). [Probably of Mongol derivation.]

تورالماك *tura-'l-mak* (v. pass.) to be born, to be increased in numbers [said of the generations of men or animals].

توراماک *tura-mak* (v. intr.) to increase in numbers [said of the progenitor].

توربا *turba* (subs.) a nose-bag [for feeding horses] (for *tobra*).

تورت *tört* (num.) four.

تورتاو *tört-ao* (subs.) a four.

تورتاولان *tört-ao-lan* (subs.) a four, Kaz.

تورتاوي *tört-awi* (subs.) a four, Kaz.

تورتايلان *tört-aïlan* (subs.) a four.

تورتلانچي *tört-lanchi* (adj.) fourth, Kaz.

تورتونچي *tört-unchi* (adj.) fourth.

تورتماک *turt-mak* (v. tr.) to poke, to prod (as a sleeping man, to awaken him).

تورتوشماک *turt-ush-mak* (v. recip.) to poke at one-another.

تورتونماك	*turt-un-mak* (v. refl.) to poke at one's self [used of the Russians crossing themselves], KAZ.
توردورماك	*tür-dür-mak* (v. caus.) to cause to wind up, [from *turmak*].
تورسوق	*tursuq* (subs.) a leather water bottle, KAZ.
تورغاي	*turghaï* (subs.) a lark.
تورغوزماق	*tur-ghuz-maq* (v. caus.) to cause to stand up, to arouse.
تورغون	*tur-ghun* (adj.) tame [from *tur-maq* "to remain"].
تورقا	*turqa* (adj.) silken (used for the stuff of a kind of sieve).
تورلاماق	*tur-la-maq* (v. tr.) to net (stitch); also to catch in a net.
تورلاماك	*tur-la-mak* (v. tr.) to change appearance, attributes or accompaniments, A. T.
تورلانماك	*tur-la-'n-mak* (v. refl.) to change one's own appearance or attributes or accompaniments, A. T.
تورلوک	*tur-luk* (adj.) various, diverse, [probably from *taur*, A.].
تورماق	*tur-maq* (v. intr.) to stand, to rise on to one's feet, to remain, to stay [from the Continuative Participle of this verb a corrupted form, *dur*, is in use as an auxiliary which has acquired the simple meaning of "is." See Gram.].
تورماک	*tur-mak* (v. tr.) to wind up, to roll up, KH.
تورنا	*turna* (subs.) a large bird with a long neck (? a crane), KH. KAZ.
توروشماق	*tur-ush-maq* (v. recip.) to stand together, to rise up together.
توروشماک	*tur-ush-mak* (v. recip.) to wind up together.
توروغ توروق	*turugh* *turuq* } (adj.) bay [the colour of a horse].
تورولماک	*tur-ul-mak* (v. pass.) to be wound or rolled up.
توروم	*turum* (subs.) an axle and socket (of a wheel), a door socket.
تورومطای	*turumtaï* (subs.) a sparrow-hawk.
تورونماق	*tur-un-maq* (v. refl.) to fix one's self [not in common use, but the probable origin of the name "*Tungani*," quasi

turun-gan " one who fixes himself," corrected to *trungan* and *Tungan* " a settler or colonist"] ; from *tur-maq* " to stand."

توره	*turah* (subs.). The same as *turâ.*
توز	*tüz* (adj.) straight, direct, right.
توز	*tuz* (subs.) salt.
توز	*toz* (subs.) the thin sheets of bark of the mountain birch tree, used as paper.
توزاتتورماک	*tüz-a't-tur-mak* (v. caus.) to cause to make right.
توزاتشماک	*tüz-a't-ish-mak* (v. recip.) to make right together.
توزاتماک	*tüz-a't-mak* (v. tr.) to make right, to mend.
توزالماک	*tüz-a'l-mak* (v. pass.) to be made right, to become right.
توزاق	*tuzâq* (subs.) a springe, a horse hair loop for catching birds.
توزان	*tozan* (subs.) dust in the air.
توزدورماق	*toz-dur-maq* (v. caus.) to raise the dust.
توزدورماق	*toz-dur-maq* (v. caus.) to wear out (clothes).
توزدورماک	*tüz-dur-mak* (v. caus.) to cause to make straight.
توزغاق	*tozghâq* (subs.) the cotton-like seed pods of a certain reed.
توزلیق	*tûz-liq* (adj.) salt, tasting salt.
توزلیک	*tüz-lik* (subs.) straightness.
توزماق	*toz-maq* (v. intr.) to rise in clouds (said of dust).
توزماق	*toz-maq* (v. intr.) to wear out, to become old.
توزماک	*tûz-mak* (v. intr.) to be enduring, to be patient [governs *gha*].
توزماک	*tüz-mak* (v. tr.) to straighten, to make straight.
توزوک	*tüz-ük* (subs. and adj.) arrangement, order, institution ; straight, arranged, orderly, correct. [Cf. the " *Tüzük Timuri*" so-called].
توس	*tüs* (subs.) appearance.
توس	*tos* (subs.) the thin sheets of bark of the mountain birch-tree. See *toz.*
توستاغان	*tostaghan* (subs.) a small wooden cup, KAZ.

توستورماق	*tos-tur-maq* (v. caus.) to cause to arrest, to get (any-one) stopped.
توسماق	*tos-maq* (v. tr.) to stop, to arrest.
توش	*tüsh* (subs.) a dream, a vision.
توش	*tûsh* (subs.) direction.
توش	*tüsh* (subs.) mid-day.
توش	*tösh* (subs.) breast, chest.
توشاک	*tosha'k* (verbal subs.) bed, bedding.
توشالماک	*tosha-'l-mak* (v. pass.) to be spread, to be laid out; [used of any thing for sitting or lying upon].
توشاماک	*tosha-mak* (v. tr.) to spread, to lay out [as above].
توشاماک	*tüsh-a-mak* (v. tr.) to dream of, to see in a dream.
توشقارماق توشقازماق	*tosh-qar-maq* *tosh-qaz-maq* } (v. caus.) to fill, (to cause to be full).
توشقان	*taushqan* (subs.) a hare.
توشلانماک	*tüsh-la-'n-mak* (v. refl.) to eat the mid-day meal with any one.
توشلوق	*tush-luq* (subs. and adj.) equivalent.
توشلوک	*tüsh-lük* (subs.) the mid-day meal.
توشماک	*tüsh-mak* (v. intr.) to descend, to come down, to get off, to settle down [joined with other words to indicate various meanings, of which *tüsh-mak* supplies the element "down." Thus *ât-din tüsh-mak* "to dismount;" *tüsh-üp-ul-turmaq* "to sit *down*"; *yaqilip tüsh-mak* "to fall *down*"; *tüsh-üp qâl-mâq* "to remain fallen" *i. e.*, "to have fallen off]."
توشورماک	*tüsh-ür-mak* (v. caus.) to cause to descend, &c., [takes the place of *tüsh-mak* in transitive compounds, as *tüshür-üp sâlmâq* "to throw down"].
توشوک	*tushuk* (subs.) a hole, an aperture.
توشوک	*tüsh-ük* (subs.) a loss at play, losings (from *tüsh-mak*).
توشوماق	*toshu-maq.* (See *tashi maq.*)
توغ	*tugh* (subs.) a yak's tail fastened at the top of a long stick

and used as the standard of a military officer of rank (not below that of Pansad or chief of five hundred); also to mark the graves of saintly personages.

توغا *togha* (subs.) a D-shaped buckle (without pin) attached to surcingles and girths.

توغاچي *toghachi* (subs.) a head-man, chief of an encampment or village, Kaz.

توغاناق *togha-naq* (subs.) a wooden square buckle used in fastening on a camel's load, Kaz.

توغاي *toghâi* (subs.) a plain covered with reeds.

توغدورماق *tugh-dur-maq* (v. caus.) to beget.

توغراتماق *toghra-'t-maq* (v. caus.) to cause to cut up small, to cause to mince.

توغراشماق *toghra-'sh-maq* (v. recip.) to cut up together.

توغراغو *toghraghu* (subs.) a juice exuding from the *toghraq* tree, and used as leaven in baking.

توغراق *toghraq* (subs.) a kind of Poplar tree.

توغرام *toghra'm* (verbal subs.) a morsel.

توغراماق *toghra-maq* (v. tr.) to cut up small, to mince.

توغري *toghri* (adj.) straight.

توغقان *tugh-qan* [pron. *tuq-qan*] (subs.) a relation, a relative; [*bir tugh-qan* applies to brothers and sisters (of one generation); *iki tugh-qan* applies to first cousins, *i. e.*, born of parents who were brothers or sisters (*lit.* two generations), and so on. This may be translated "related in the first, second, third, &c., degree"].

توغلوق *tugh-luq* (adj.) possessed of the *tugh*, *i. e.*, entitled to carry the insignia of military rank. [Several Turkish Princes have borne this title, as, Tughluq Timur Khan, &c.]

توغما *tugh-ma* (subs.) a slave bred in the house; the child of slave parents.

توغماق *tugh-maq* (v. intr.) to give birth to, to bear [takes the object merely prefixed without the mark of the accusative: as, *ughul tugh-di* "she bore a son"].

توغوت	*tughut* (subs.) child-bearing, labour.
توف	*tuf* (subs.) saliva.
توف	*tôf* (subs.). For *tôp*.
توفا	*tufa* (subs.). For *tupa*.
توفا	*tofa* (subs.). For *topa*.
توفراق	*tofraq* (subs.) dust, earth, Kh.
توفوروك	*tufuruk* (subs.) saliva.
توق	*toq* (adj.) satiated, sated.
توقا	*toqa* (subs.). The same as *togha*.
توقاچ	*toqâch* (subs.) a small biscuit.
توقال	*toqal* (subs.) the junior wife; also a hornless cow, Kaz.
توقاي	*toqaï* (subs.). The same as *toghaï*.
توقتاتماق	*toqta-'t-maq* (v. caus.). The same as *tokhtatmaq*.
توقتاشماق	*toqta-'sh-maq* (v. recip.). The same as *tokhtashmaq*.
توقتاماق	*toqta-maq* (v. intr.). The same as *tokhta-maq*.
توقسابا	*toq-saba* (subs.). The title of civil official of rank [according to Prof. Vámbéry, derived from *tugh* + *sahib*].
توقسان	*toqsan* (num.) ninety [qu. *töqös* "nine," + *un* "ten]."
توقسانينچي	*toqsan-inchi* (num. adj.) ninetieth.
توققان	*tuq-qan* (subs.). The same as *tugh-qan*.
توقماق	*toqmaq* (subs.) a mallet.
توقماقچي	*toqmaq-chi* (subs.) a man who uses a mallet, or who makes them.
توقماقلاماق	*toqmaq-la-maq* (v. tr.) to strike with a mallet or with any heavy object.
توقوتماق	*toqu-'t-maq* (v. caus.) to cause to weave.
توقوز	*toqöz* (num.) nine.
توقوزاولان	*toqöz-aolan* (num. subs.) a nine, Kaz.
توقوزايلان	*toqöz-aïlan* (num. subs.) a nine.
توقوزونچي	*toqöz-unchi* (num. adj.) ninth.
توقوشماق	*toq-ush-maq* (v. recip.) to strike or brush against one another [qu. from an obsolete verb *toq-maq* "to strike," which has survived in the Osmanli dialect].

توقوشماق	*toqu-'sh-maq* (v. recip.) to weave in company.
توقوم	*toqum* (subs.) a felt put under the saddle.
توقوماق	*toqu-maq* (v. tr.) to weave.
توك	*tuk* (subs.) hair on men or animals' bodies (exclusive of beard, hair of the head, mane, tail, &c., which have separate names).
توكار	*tokar* (adj.) lame.
توكاي	*tokaï* (subs.) leggings reaching up to the thighs, CHIN. (?).
توكتورماك	*tuk-tur-mak* (v. caus.) to cause to empty by pouring out.
توكماك	*tûk-mak* (v. tr.) to empty by throwing out the contents.
توكورماك	*tuk-ur-mak* (v. tr.) to spit.
توكوروك	*tukuruk* (subs.) saliva.
توكا	*tuga* (subs.) a camel, [the variety is specified by prefixes: as *aïri-tuga* the double humped camel, and *nâr tuga* the single humped camel].
توكاتماك	*tuga-'t-mak* (v. caus.) to cause to come to an end, to conclude, to finish (tr.).
توكاراك	*tugarak* (subs. and adj.) circuit; circular.
توكاشماك	*tuga-'sh-mak* (v. recip.) to come to a conclusion mutually, to come to terms together.
توكالماك	*tuga-'l-mak* (v. pass.) to be finished [the sense of the Pass. taken from the Causative].
توكاماك	*tuga-mak* (v. intr.) to come to an end.
توكانماك	*tuga-'n-mak* (v. refl.) to finish itself, or one's self, [practically almost equivalent to the passive].
توگما	*tugma* (subs.) a button.
توگماك	*tüg-mak* (v. tr.) to tie in a knot.
توگون	*tügün* (subs.) a knot (not a bow).
توگونچاك	*tügün-chak* (subs.) a knot enclosing any small object [as when money is tied up inside a knot in the turban or sash].
تول	*tül* (subs.) the total of the lambs produced in each year from a flock of sheep; the year's increase of the flock.

تول	*tul* (adj.) widowed.
تولا	*tola* (adj. and adv.) many, much, very.
تولاتتورماك	*tola-'t-tur-mak* (v. caus. redupl.) to cause to compensate.
تولاتماك	*tola-'t-mak* (v. caus.) to cause to compensate.
تولاشماك	*tola-'sh-mak* (v. recip.) to compensate one-another.
تولاماك	*tola-mak* (v. tr.) to compensate, to make up for a loss of property.
تولدورماق	*tol-dur-maq* (v. caus.) to fill.
تولغاتماق	*tolgha-'t-maq* (v. caus.) to cause to twist.
تولغاق	*tolgha-'q* (vl. subs.) labour [of a woman with child].
تولغاماق	*tolgha-maq* (v. tr.) to twist, to twirl [generally applied to things which resist the process and require force, whereas *tâu-la-maq* applies to materials which yield easily].
تولغانماق	*tolgha-'n-maq* (v. refl.) to twist one's self, to writhe.
تولقون	*tolqun* (subs.) a wave, a breaker.
تولقونلاماق	*tolqun-la-maq* (v. intr.) to break into waves, to surge up.
تولكي	*tülki* (subs.) a large yellow variety of fox.
تولماق	*tol-maq* (v. intr.) to be full.
تولوم	*tulum* (subs.) a goat-skin taken off entire, freed of hair and otherwise prepared; used for holding grain or flour.
تولون آي	*tolun äi* (comp. subs.) the full moon.
توم	*tôm* (adj.) thick, substantial [used almost exclusively in application to spices and medicinal roots].
تومار	*tumâr* (subs.) a written charm, KAZ.
تومار	*tûmar* (subs.) a root of a tree dug up for fuel, *also* a log of drift wood.
توماغه	*tumagha* (subs.) a hood (put on a hawk or hawking-eagle's [head).
توماق	*tumaq* (subs.) a fur cap with three lappets, one for the nape of the neck, and one for each ear.
تومان	*tumân* (subs.) a fog.
تومان	*tuman* (subs.). For *tuban*.
تومتاق	*tumtaq* (subs.) a short story, a fable, a parable.

تومشوق *tumshuq* (subs.) a beak, an animal's nose; a projection (of mountain).

توموتماق *tum-ut-maq* (v. caus.). For *tamitmaq* (which see).

توموز *tumuz* (subs.) the dog-days, the height of summer, A. (?)

توموزماق *tum-uz-maq* (v. caus.). For *tamizmaq* (which see).

تون *tün* (subs.) night.

تون *tûn* (subs.) a robe reaching to the calf [the usual outer garment of Central Asiatics].

تونا گون *tün-a-gön* (adv.) yesterday [from *tün* "night" and *gön* *(kön)* "day"; qu. 'the day belonging to last night'].

تونگ *tung* (subs.) a wooden barrel for holding water, [fastened together with twisted wooden bands instead of hoops].

تونگ *tong* (adj.) hard frozen [used chiefly of earth, mud, &c., not of water].

تونگغوز *tongghuz* (subs.) a pig.

تونگکوز *tong-köz* (adj.) foreign, strange [said to be derived from *tong* and *köz*, (*lit.* 'frozen-eyes') because a stranger recognises no one, and preserves a cold aspect].

تونگلاتماق *tong-la-'t-maq* (v. caus.) to cause to freeze.

تونگلاشماق *tong-la-'sh-maq* (v. recip.) to freeze together, or, all at once.

تونگلاماق *tong-la-maq* (v. intr.) to become frozen, to freeze; also, to harden with the cold, as butter.

تونگلوق *tong-luq* (subs.) a hard frozen field [distinguished from the rest of the country where, no water having been artificially let in, the ground remains loose and friable through the severest frosts, such is the dryness of the climate].

تونگلوک *tungluk* (subs.) a chimney (that part of it which projects above the roof); also, a hole in the roof, whether for the escape of smoke (from a Kirghiz tent), or for the admission of light; also, the felt sheet with which it is closed at night. [? derived from *tütün* "smoke"].

تونوتماق	***tunu-'t-maq*** (v. caus.). For *tanu-'t-maq* (which see).
تونوشماق	***tunu-'sh-maq*** (v. recip.). For *tanu-'sh-maq* (which see).
تونوکا	***tunuka*** (subs.) sheet iron, thin iron.
تونوگون	***tün-ü-gön*** (adv.) yesterday, [see *tünagön*].
تونوماق	***tunu-maq*** (v. tr.). For *tanumaq*, (which see).
تورق	***tuwaq*** (subs.) a hoof.
توي	***tōï*** (subs.) a feast [either on the occasion of the circumcision of a boy, or of a marriage].
تويا	***tüya*** (subs.) a camel, Kh. Kaz.
توياچي	***tüya-chi*** (subs.) a guardian or attendant of camels.
توياق	***tuyaq*** (subs.) a hoof, Kh. Kaz.
تويدورماق	***tōï-dur-maq*** (v. caus.) to cause to be satiated, to satiate.
تويدورماق	***tüï-dur-maq*** (v. caus.) to make (any one) aware of, to divulge.
تويدورماک	***tüi-dur-mak*** (v. caus.) to cause to pound up.
تويلوق	***toï-luq*** (subs.) preparations for a wedding feast; the bride's 'corbeille de marriage.'
تويماق	***toï-maq*** (v. intr.) to be satiated, to have one's hunger appeased, to be sated.
تويماق	***tüi-maq*** (v. tr.) to become aware of, to find out (a secret).
تويماک	***tüi-mak*** (v. tr.) to pound, to reduce to powder by pounding.
تيپا	***tipa*** (subs.) a small height, a mound [restricted meaning of the word *tupa*].
تيپتورماک	***tip-tur-mak*** (v. caus.) to cause to kick.
تيپماک	***tip-mak*** (v. tr.) to kick.
تيپنماک	***tip-in-mak*** (v. refl.) to stamp on the ground; also, to kick one's horse's flanks with one's heels, "piquer des deux," Fr.
تيپوشماک	***tip-üsh-mak*** (v. recip.) to kick one another.
تيبات	***Tibat*** (subs.) the country of Tibet (our so-called "Thibet"); also, an inhabitant of that country [the name is restricted to the districts on the upper Indus from Baltistân upwards, and is not extended to Eastern Tibet or Lhassa].

تیبان	*tiban* (subs.) a packing needle.
تیبراتماک	*tibra-'t-mak* (v. caus.). See *tabratak.*
تیبراشماک	*tibra-'sh-mak* (v. recip.). See *tabrashak.*
تیبراماک	*tibra-mak* (v. intr.). See *tabramak.*
تیبرانماک	*tibra-'n-mak* (v. refl.). See *tabranak.*
تیبلغ	*tibilghu* (subs.) a mountain bush of whose wood the handles of riding-whips are made.
تیبنه	*tibanah* (subs.) a packing needle. See *tiban.*
تیر	*tir* (subs.) perspiration.
تیرا	*tira* (subs.) skin (of men or animals).
تیراتماک	*tira-'t-mak* (v. caus.) to cause to prop up.
تیراشماک	*tira-'sh-mak* (v. recip.) to prop up in company.
تیراک	*tira-'k* (vl. subs.) a prop, a support (written also *tarak*).
تیراک	*tirak* (subs.) a variety of poplar grown in cultivated land.
تیراماک	*tira-mak* (v. tr.) to prop up, to support (by artificial means).
تیرباسماق	*tir basmaq* (comp. v. tr.) to perspire ; also, to be ashamed [lit. "perspiration oppresses (him)"], (*tir* is the nominative, and the English subject takes the accusative form).
تیرتیق	*tirtiq* (adj.) having the skin drawn up by a wound or burn, [properly "*tartiq*"]. Also, (subs.) a scar.
تیردورماک	*tir-dur-mak* (v. caus.) to cause to gather up.
تیرساک	*tirsak* (subs.) elbow.
تیرگوزماک	*tirg-üz-mak* (v. caus.) to cause to live, to give life ; [for *tirik-guzmak*].
تیرلاتماک	*tir-la-t-mak* (v. caus.) to cause to perspire, to cause to sweat.
تیرلاشماک	*tir-la-'sh-mak* (v. recip.) to perspire together, to work hard in company.
تیرلاماک	*tir-la-mak* (v. intr.) to perspire.
تیرماق	*tirma'q* (v. subs.) a finger-nail, a claw, a talon (the points or nails of the same) [from *tirma-maq*].

تیرماک	***tir-mak*** (v. tr.) to gather up, to collect, to pick up (many small objects one by one).
تیرمالاماق	***tirma-la-maq*** (v. tr.) to cover seed up with earth after sowing (by hand).
تیرماماک	***tirma-maq*** (v. tr.) to scratch, to tear with the nails or claws.
تیرناتماق	***tirna-'t-maq*** (v. caus.) to cause to scratch.
تیرناشماق	***tirna-'sh-maq*** (v. recip.) to scratch one another.
تیرناق	***tirna-'q*** (v. subs.) a finger nail, a claw. See ***tirmaq***. [claws.
تیرناماق	***tirna-maq*** (v. tr.) to scratch, to tear with the nails or
تیري	***tiri*** (subs.) the skin of any animal. See ***tira***.
تیریکتورماک	***tîrik-tur-mak*** (v. caus.) to cause to be angry, to anger.
تیریکشماک	***tîrik-ish-mak*** (v. recip.) to be angry with one another.
تیریکماک	***tîrik-mak*** (v. intr.) to be angry [governs ***gha***].
تیریگ‌لیک	***tir-ig-lik*** (vl. adj.) gathered up, stored [from ***tir-mak***].
تیریلغو	***tîri-'l-ghu*** (vl. adj.) cultivable [for ***tarilghu*** from ***tarimaq***].
تیریلماق	***tîri-'l-maq*** (v. pass.) to be cultivated, to be sown.
تیریم	***tîrim*** (subs. and adj.) cultivated land; cultivated.
تیریماق	***tîri-maq*** (v. tr.) to cultivate, to sow [for ***tarimaq***].
تیز	***tez*** (adj. and adv.) quick, fast; also, quickly, P.
تیز	***tez*** (subs.) an instrument used for straightening or bending rods of tents, &c. [It consists of a strong piece of wood laid horizontally with a gap in its upper side to receive the object which requires to be straightened or bent], KAZ.
تیزا	***tîza*** (subs.) a knee [the same as ***tiz***].
تیزاک	***tizak*** (subs.) horse dung.
تیزراق	***tez-râq*** (adj. and adv.) quicker; more quickly.
تیزگین	***tizgin*** (subs.) reins, bridle.
تیزلانماک	***tiz-la-'n-mak*** (v. refl.) to rest on one's knees, to kneel.
تیزماك	***tiz-mak*** (v. tr.) to arrange in rows, or in line.
تیش	***tish*** (subs.) tooth.

تيشاتماك	*tish-a't-mak* (v. caus.) to cause to file the teeth of a saw.
نيشاماك	*tish-a-mak* (v. tr.) to file the teeth of a saw.
تيشتورماك	*tish-tur-mak* (v. caus.) to cause to make holes.
تيشقاري	*tish-q'ari* (adv.) outside [for *tàshqari*].
تيشلاتماك	*tish-la-'t-mak* (v. caus.) to cause to bite.
تيشلاشماك	*tish-la-'sh-mak* (v. recip.) to bite one another.
تيشلاماك	*tish-la-mak* (v. tr.) to bite [from *tish* "tooth"].
تيشماك	*tish-mak* (v. tr.) to perforate, to make a hole in.
تيشوك	*tish-ük* (vl. subs.) a hole, a perforation.
تيشولماك	*tish-ül-mak* (v. pass.) to be perforated, to be pierced with a hole.
تيشه	*tishah* (subs.) an adze, a cutting tool with its edge set at right angles to the stock, and its inner surface at an acute angle with the same.
تيشي	*tishi* (adj.) female.
تيشيک	*tish-ik* (vl. subs.) a perforation [from *tish-mak*].
تيفا	*tifa* (subs.). For *tipa*.
تيفماك	*tif-mak* (v. tr.). For *tipmak*.
تيقتورماق	*tiq-tur-maq* (v. caus.) to cause to ram in.
تيقشماق	*tiq-ish-maq* (v. recip.) to ram in in company.
تيقماق	*tiq-maq* (v. tr.) to press anything into a receptacle, to ram in.
تيک	*tik* (adj. and subs.) vertical, upright, steep, difficult ; also, a steep place.
تيکان	*tikan* (subs.) a thorn.
تيكلاتماك	*tik-la-'t-mak* (v. caus.) to cause to set upright.
تيكلاشماك	*tik-la-'sh-mak* (v. recip.) to set upright together.
تيكلاماك	*tik-la-mak* (v. tr.) to set upright.
تيكماك	*tik-mak* (v. tr.) to sew, [see *takmak*].
تيكيس	*tikis* (adj.) smooth.
تيكيسلاتماك	*tikis-la-'t-mak* (v. caus.) to cause to make smooth.
تيكيسلاشماك	*tikis-la-'sh-mak* (v. recip.) to make smooth together.
تيكيسلاماك	*tikis-la-mak* (v. tr.) to make smooth.

تیکیسلانماك	***tikis-la-'n-mak*** (v. pass. or refl.) to be made smooth, to become smooth.
تیکه تیکه	***tikah tikah*** (adv.) in pieces [***tikah tikah qeldi*** "he put (it) in pieces"].
تیگشتورماك	***tig-ish-tur-mak*** (v. recip. caus.) to cause to exchange.
تیگشماك	***tig-ish-mak*** (v. recip.) to change anything against another, to exchange [from ***tigmak***].
تیگماك	***tig-mak*** (v. intr.) to touch, to attain, to reach [governs ***gha***].
تیگورماك	***tig-ür-mak*** (v. caus.) to cause to touch, to cause to attain (a mark), to hit [in the sense of reaching the object aimed at].
تیگورمان	***tigürman*** (subs.) a mill. [Qu. from ***tigür-mak*** "to cause to touch"].
تیگوزماك	***tig-üz-mak*** (v. caus.). The same as ***tigürmak***.
تیگین	***tigin*** (subs.) the absence of a price (paid); ***tigin-ga*** "gratis," "for nothing," Kaz.
تیل	***til*** (subs.) tongue; also, language.
تیلاتماك	***tila-'t-mak*** (v. caus.) to cause to desire.
تیلاشماک	***tila-'sh-mak*** (v. recip.) to desire of one another, to desire together.
تیلاك	***tila'k*** (vl. subs.) an earnest petition.
تیلاماك	***tila-mak*** (v. tr.) to desire, to ask for.
تیلانچي	***tila-'n-chi*** (subs.) a beggar.
تیلپک	***tilpak*** (subs.) a fur cap.
تیلبه	***tilba*** (adj.) idiotic, foolish.
تیلبه لیک	***tilba-lik*** (subs.) idiocy, foolishness.
تیلچي	***til-chi*** (subs.) a spy, a news collector.
تیلدورماك	***til-dur-mak*** (v. caus.) to cause to split, to cause to cut anything lengthwise.
تیلفک	***til-fak*** (subs.). For ***tilpak***.
تیللاتماك	***til-la-'t-mak*** (v. caus.) to cause to abuse, to cause to scold.
تیللاشماک	***til-la-'sh-mak*** (v. recip.) to scold at one another.

تیلاماك	*til-la-mak* (v. tr.) to abuse, to scold, to 'give the rough side of one's tongue' [from *til* "tongue"].
تیلماک	*til-mak* (v. tr.) to split, to cut anything into strips lengthwise [from *til ;* qu. to make into strips like tongues].
تیلمورتماک	*tilmür-'t-mak* (v. caus.) to cause to dance attendance.
تیلمورماک	*tilmür-mak* (v. intr.) to be in a state of humble expectancy, to dance attendance.
تیلموروشماك	*tilmür-ush-mak* (v. recip.) to dance attendance together.
تیلیک	*til-ik* (vl. subs.) a slit or cut lengthwise [from *til-mak* "to slit"].
تیلیم	*til-im* (vl. subs.) a strip or tongue (what remains between slits).
تیماو	*timao* (subs.) a cold, rheum.
تیمراتکو	*timratku* (subs.) an itching red spot on the skin.
تیمور	*timur* (subs.) iron.
تیمورچي	*timur-chi* (subs.) a blacksmith, an ironsmith.
تین	*tiyin* (subs.) a squirrel, Kaz.
تیدتاك	*tintak* (adj.) mad, insane. [Qu. for *tintrak* from *tintramak.*]
تینتراتماک	*tintra-'t-mak* (v. caus.) to cause to totter, or waver.
تینتراشماک	*tintra-'sh-mak* (v. recip.) to totter or waver together.
تینترامالک	*tintra-mak* (v. intr.) to totter ; also, to vacillate, to waver.
تینچ	*tînch* (adj.) at ease, happy, well [qu. from *tin-mak*].
تینچ لیک	*tînch-lik* (subs.) ease, happiness.
تیندورماق	*tin-dur-maq* (v. caus.) to make quiet, &c. &c.
تینشماق	*tin-ish-maq* (v. recip.) to be quiet together, &c. &c.
تینگ	*tîng* (adj.) of equal height.
تینگلاتماق	*ting-la-'t-maq* (v. caus.) to cause to listen.
تینگلاتماك	*tîng-la-'t-mak* (v. caus.) to cause to make equal in height.
تینگلاشماق	*ting-la-'sh-mâq* (v. recip.) to listen to one another or together.
تینگلاسماک	*tîng-la-'sh-mak* (v. recip.) to make equal together.
تینگلاماق	*ting-la-maq* (v. tr.) to listen.

تينگلاماك *ting-la-mak* (v. tr.) to make equal (in height), also, to compare heights.

تينگيز *tingiz* (subs.) a large lake, a sea.

تينماق *tin-maq* (v. intr.) 1, to be quiet (said *e. g.* of a child); to settle (as muddy water); to be filled in and made level (as of an old well); 2, to sigh.

تينيش *tin-ish* (subs.) a sigh.

تينيق *tin-iq* (adj.) clear, not muddy; *lit.* settled.

تيوا *tiwa* (subs.) a camel.

ج

جابان *jaban* (subs.) a range of shelves (in a shop, &c.).

جابدوماق *jabdu-maq* (v. tr.) to prepare, to make ready (for an expedition).

جابدوق *jabduq* (vl. subs.) the complete accoutrement of a horse (either for riding, or for draught or carriage); also, the material preparations for a journey.

جار *jâr* (subs.) the high bank of a river [properly *yâr*].

جار *jâr* (subs.) the crying of articles, &c. in the bazár, a proclamation.

جارا *jara* (subs.) a wound [for *jarâhat*, P.].

جارانگلاتماق *jarang-la-'t-maq* (v. caus.) to cause to tinkle, to ring (a bell, &c.).

جارانگلاشماق *jarang-la-'sh-maq* (v. recip.) to tinkle together.

جارانگلاماق *jarang-la-maq* (v. intr.) to tinkle, to resound, to ring (intr.).

جارچي *jâr-chi* (subs.) a town-crier [from *jâr*].

جام *jâm* (subs.) a metal or wooden cup, P.

جامان *jaman* (adj.) bad [for *yaman*].

جامغور *jamghur* (subs.) rain [for *yamghur*].

جانگ *jang* (subs.) a cold.

جانجال *janjâl* (subs.) a tumult, a row, a quarrel, P.

جانجاللاشماق *janjâl-la-'sh-maq* (v. recip.) to quarrel with one another, to have a row.

جانسوز *jansüz* (subs.) a spy, a tell-tale [for *jasûs*, P.].

جانليق *jân-liq* (subs.) sheep or goats (considered *en masse* without reference to age or sex) [*lit.* living creature, P. T., specialized to refer to the flocks which are the principal possessions of a nomad people, as "birds," with English sportsmen, have come to mean specially partridges].

جاوا *jawa* (subs.) a sack made of coarse goat's hair.

جاوان *jawan* (subs.). For *jaban*.

جاي *jâi* (subs.) a place, P.

جايلاتماق *jâi-la-'t-maq* (v. caus.) to cause to put in the proper place, to cause to set in order.

جايلاشماق *jâi-la-'sh-maq* (v. recip.) to place in proper order mutually, or relatively to one another.

جايلاماق *jâi-la-maq* (v. tr.) to place in order, to put in the proper [place, P. T.

جايلانماق *jâi-la-'n-maq* (v. pass. and refl.) to be put or to put one's self in the proper place.

جدلچي *jadal-chi* (subs.) a quarrelsome person, a disputer, P. T.

جدللاشتورماك *jadal-la-'sh-tur-mak* (v. recip. caus.) to cause to quarrel with one another.

جدللاشماك *jadal-la-'sh-mak* (v. recip.) to quarrel with one another [from a supposed simple verb *jadal-la-mak* which is not in use, because "it takes two to make a quarrel"].

جزانه *jazanah* (subs.) interest (on money lent), usury.

جزايل *jazaïl* (subs.) a short gun carried on a camel, P.

جزايلچي *jazaïl-chi* (subs.) a man who serves the *jazaïl*, P.

جلب *jalab* (subs.) a harlot.

جلغه *jilghah* (subs.) a valley, a gorge, a ravine.

جمعه *juma'h* (subs.) Friday, the day of assembly, A.

جمه *jumah* (interj.) do you hear?

جنده *jandah* (subs.) a beggar's gaberdine [a robe with little tufts of thread-ends sticking out every here and there].

جنستة *janistah* (subs.) a small stone-fruit of the plum kind.

جنگ *jing* (subs.) a weight (equal to about 1·275 lbs.).

جوا *jûa* (subs.) a fur robe, a "posteen." For *juba*.

جواب *jawâb* (subs.) answer, dismissal, leave to go; also, leave or permission of any kind, P.

جوابلاشتورماق *jawâb-la-'sh-tur-maq* (v. recip. caus.) to cause to make retorts.

جوابلاشماق *jawâb-la-'sh-maq* (v. recip.) to answer back again, to retort; also, to discuss, dispute.

جواتماق *jawâ't-maq* (v. caus.) to cause to be occupied in anything, to amuse (said with reference to children). For *yuwatma'q*.

جوان *jawan* (adj.) mature, matronly [epithet applied to a woman who has a child, but is still young].

جوانماق *jawa-'n-maq* (v. refl.) to occupy or amuse one's self. For *yuwanmaq*.

جوبا *juba* (subs.) a fur robe, P.

جوجه *juja* (subs.) a chick.

جوف *juf* (subs.) a pair. [For *juft*, P.].

جوفلاشتورماک *juf-la-'sh-tur-mak* (v. recip. caus.) to cause to pair.

جوفلاشماک *juf-la-'sh-mak* (v. recip.) to match together, to be similar; also, to be joined together smoothly.

جوفلاماك *juf-la-mak* (v. tr.) to match or pair (two objects), to render similar or equal; also, to join together smoothly.

جوگان *jugan* (subs.) a horse's headstall and bit.

جول *jul* (subs.) a horse blanket, P.

جوناتماک *juna-'t-mak* (v. caus.) to cause to start.

جوناشماک *juna-'sh-mak* (v. recip.) to start together.

جوناماك *juna-mak* (v. intr.) to start, to depart.

جیاك *jiak* (subs.) an edging or binding (of any garment, on the outer side, such as a tape sown round).

جیاكلاتماک *jiak-la-'t-mak* (v. caus.) to cause to put an edging (to a garment).

جیاکلاشماک	*jiak-la-'sh-mak* (v. recip.) to put an edging on in company.
جیاکلاماک	*jiak-la-mak* (v. tr.) to put an edging or binding on a garment.
جیب	*jib* (subs.) thread (of cotton).
جیران	*jiran* (subs. and adj.) an antelope or gazelle *(Saiga Tartarica)* ; also, chesnut (the colour of a horse).
جیق	*jiq* (adv.) much, many.
جیکده	*jikda* (subs.) the Trebizond date tree and fruit.
جیل	*jil* (subs.) wind ; also *yil*.
جیلاو	*jilao* (subs.) a thin rope attached to the horse's bit on one side, and used for fastening him up on dismounting. Its loose end is carried noosed to the pummel of the saddle.
جیلیم	*jilim* (subs.) glue.
جین	*jin* (subs.) a sort of Demon, A.
جیناک	*jaïnak* (subs.) elbow.

چ

چابا	*chaba* (subs.) sweepings, refuse. For *chabar*.
چاباق	*chabaq* (subs.) a species of fish.
چاپات	*chapat* (subs.) a pat, a slap ; also, a thin cake made by patting the dough between the hands. [Cf. *chupatti*, H.].
چاپاق	*chapaq* (subs.) gumminess in the eyes.
چاپاغان	*chap-a-ghan* (subs.) a rapid expedition.
چاپالاق	*chapalaq* (subs.) the flat of the hand (as used for giving a slap), a slap. [Also written *shapalaq*.]
چاپان	*chapan* (subs.) a robe or gown reaching nearly to the ancles [the ordinary outer garment of Central Asia].
چاپاو	*chapáo* (subs.) a plundering.
چاپاول	*chapául* (subs.) a plundering raid ; also, a charge of cavalry.
چاپتورماق	*chap-tur-maq* (v. caus.) 1, to cause to gallop ; 2, to cause to strike with the sword or any cutting instrument.

چاپشماق	*chap-ish-maq* (v. recip.) 1, to gallop together, to race against one another (of horses); 2, to strike one another with swords, to fight one another with swords.
چاپقو	*chap-qu* (subs.) a board for chopping on.
چاپقولاتماق	*chap-qu-la-'t-maq* (v. caus.) to cause to chop.
چاپقولاشماق	*chap-qu-la-'sh-maq* (v. recip.) to chop at one another, or in company.
چاپقولاماق	*chap-qu-la-maq* (v. tr.) to strike repeatedly with a sharp instrument, to chop.
چاپقون	*chap-qu'n* (subs.) a snow storm accompanied by a cutting wind.
چاپماق	*chap-maq* (v. intr.) to gallop.
چاپماق	*chap-maq* (v. tr.) to strike with a cutting instrument.
چاپي	*chapi* (subs.) a shampooing.
چاپيق	*chap-iq* (vl. subs.) a cut, a wound [so called even after healing].
چات	*chat* (subs.) the angle at the junction of two streams [used elsewhere for angles formed by other things].
چاتاغ چاتاق	*chatâgh* *chatâq* } (adj.) puzzle-headed, confused, at cross purposes.
چاتشماق	*chat-ish-maq* (v. recip.) to tie many horses two by two.
چاتماق	*chat-maq* (v. tr.) to tie two horses together, the head of each to the crupper of the other [this is the common way of securing caravan horses in the open plains and treeless mountains of Central Asia].
چاتوق چاتيق	*chatuq* *chat-iq* } (subs.) a couple of horses thus fastened together; also, the fastening of them so.
چاجماک	*chajmak* (subs.) a jacket with long sleeves.
چاچ	*chach* (subs.) the hair of the head.
چاچاق	*chachaq* (subs.) a fringe, a tassel.
چاچماق	*chach-maq* (v. tr.) to scatter seed, to sow.
چاچيراماق	*chachira-maq* (v. intr.) to splash, to be splashed (of water).

چارا *chara* (subs.) a large wooden bowl or vessel.

چارا *châra* (subs.) help, remedy, P.

چارالاتماق *chara-la-'t-maq* (v. caus.) to cause to remedy.

چارالاشماق *châra-la-'sh-maq* (v. recip.) to remedy together.

چارا لاماق *châra-la-maq* (v. tr.) to remedy.

چارک *chârak* (subs.) a certain weight. [There are three distinct *charaks* in Eastern Turkistán: One used for raw silk, certain colouring materials, spices, tea, &c.; it is equal to 4 *jings*, or 5 lbs. The second is used for all manner of goods, and is called *ashliq tashi* "food weight," also *tört-taṣh* "four weights"; it weighs 12½ *jings* or nearly 16 lbs. This is distinguished from the third sort recently introduced by the Amir which is called *besh-tash* "five weights," and weighs 16 *jings* or 20 lbs.]

چارلاتماق *char-la-'t-maq* (v. caus.) to cause to reconnoitre.

چار لاشماق *char-la-'sh-maq* (v. recip.) to reconnoitre one another, to reconnoitre in company.

چارلاق *char-la'q* (vl. subs.) a reconnaissance.

چارلاقچي *char-la'k-chi* (subs.) a reconnoiterer, a patrol.

چارلاماق *char-la-maq* (v. tr.) to reconnoitre.

چاروا *chârwa* (subs.) quadrupeds, cattle, P.

چاروا دار *chârwa-dar* (subs.) an owner of cattle, sheep or other quadrupeds.

چاروزه *charozah* (subs.) a small carpet the length of a bed.

چاروق *châroq* (subs.) a rough boot of untanned leather formed like a mocassin with the lower leather drawn up round the foot; worn by the Kirghiz mountaineers, and by caravan-men for journeys.

چاري *châri* (subs.) grain with the husk on.

چازا تاش *chaza tash* (subs.) jade stone obtained from the quarries in the mountains. Distinguished from *su-tash* "water-stone," which is jade found in the form of rolled pebbles in the streams. In this state it is free from flaws which have all been found out by the hard usage it has received, so that what remains is solid. This gives it a greater value for carving; whereas in carving a piece of *chaza tash*, the risk is incurred of finding many days of labour spoilt, by a hidden flaw or crack.

چاش *chash* (subs.) a heap of grain piled up after thrashing and winnowing. Also for *chasht* (which see), P.

چاشب *cha-shab* (subs.) light bed clothes for the summer [? for *chadir-i-shab*, P.].

چاش غلبر *chash-ghalbir* (subs.) an open sieve for separating the chaff from the grain.

چاشگا *châsh-gâ* (comp. subs.) the hour half way between sun-rise and midday, (at which a meal is often eaten), P.

چاشلاتماق *chash-la-'t-maq* (v. caus.) to cause to heap up grain.

چاشلاشماق *chash-la-'sh-maq* (v. recip.) to heap up grain together.

چاشلاماق *chash-la-maq* (v. tr.) to heap up cleaned grain.

چاغ *chàgh* (subs.) account, reckoning, conjecture, inference; also, number; also, time, epoch (any fixed time).

چاغاتاي *Chaghataï* (subs.) (Pr. name.) A son of Chinghiz Khán; his descendants or family; the tribes over which they ruled; the country ruled by them (in some books this includes the whole patrimony of Chaghataï, but usually only that which was left after the separation of the Kháns of the Moghuls, *viz.*, Western Turkistân); the language spoken in Western Turkistân. [The term is now dying out except in talking of the past.]

چاغان *chaghan* (subs.) a winter festival of Chinese origin.

چاغلاتماق *chagh-la-'t-maq* (v. caus.) to cause to conjecture.

چاغلاشماق *chagh-la-'sh-maq* (v. recip.) to form conjectures together.

چاغلاماق *chagh-la-maq* (v. tr.) to conjecture, to surmise, to reckon (anything that is expressed in numbers).

چاغلوق *chagh-lük* (adj.) conjectural [from *chàgh*].

چاق *chaq*. The same as *chàgh*.

چاقا	*chaqa* (subs.) a copper coin, Kh.
چاقان	*chaqan* (adj.) light coloured (applied to eyes).
چاقان	*chaq-qan* (vl. adj.) fiery, sparkish, excitable.
چاقلاماق	*chaq-la-maq* (v. tr.). The same as *chagh-la-maq*.
چاقماق	*chaq-maq* (v. tr.) to bite or sting (with venom); to slander, to detract.
چاقماق	*chaq-maq* (v. intr.) to sparkle, to give forth sparks; also, (v. tr.) to crack.
چاقماق	*chaqmaq* (subs.) a steel for striking a light on flint.
چاقیچ	*chaqich* (subs.) a kind of resin extracted from the birch tree and also from firs.
چاقیر تماق	*chaqir-'t-maq* (v. caus.) to cause to call.
چاقیرشماق	*chaqir-'sh-maq* (v. recip.) to call in company.
چاقیرماق	*chaqir-maq* (v. tr.) to call, to summon.
چاقیشتورماق	*chaq-ish-tur-maq* (v. recip. caus.) to cause to sting or slander one another.
چاقیشماق	*chaq-ish-maq* (v. recip.) to sting one another, to slander one another.
چاقیلماق	*chaq-il-maq* (v. pass.) to be slandered; 2, to be cracked.
چاقینماق	*chaq-in-maq* (v. refl.) to sparkle, to lighten of itself (of the lightning).
چال	*chál* (adj.) partly black and partly white (of the hair, or beard), Kh.
چالا	*chála* (adj.) unfinished, incomplete.
چالاب	*chaláb* (subs.) a drink made by mixing water with curds and whey.
چالبار	*chalbar* (subs.) wide outer trowsers made of leather (into which the robes are tucked for work in which they would be in the way), P. (*shalwas*).
چالبارقاتماق	*chalbar-qa-'t-maq* (v. caus.) to cause to scold.
چالبار قاشماق	*chalbarqa-'sh-maq* (v. recip.) to scold one another.
چالبارقاماق	*chalbarqa-maq* (v. intr.) to scold, to upbraid, to abuse.
چالپاک	*chalpak* (subs.) a thin cake of bread cooked in oil.

چالپایماك	*chalpaï-maq* (v. intr.) to sink down exhausted, to be prostrated (by weakness).
چالچیق	*chalchiq* (subs.) a boggy or miry spot, (permanent).
چالشتورماق	*châl-ish-tur-maq* (v. recip. caus.) to cause to wrestle.
چالشماق	*châl-ish-maq* (v. recip.) to twist one another, to wrestle.
چالقا	*chalqa* (subs. and adv.) on one's back, face upwards; also, *chalqa-si-da*, &c.
چالقایتماق	*chalqa-i't-maq* (v. caus.) to cause to lie face upwards, to turn any one over on to his back.
چالقایملق	*chalqa-i-maq* (v. intr.) to lie on one's back.
چالقیماق	*chalqi-maq* (v. intr.) to surge (of water).
چالما	*chalma* (subs.) a lump of hard earth, a piece of sun-dried brick.
چالماق	*châl-maq* (v. tr.) to twist over; specially 1, to trip up; 2, to braid, to tat, to crochet; 3, to stir up (of liquids); 4, to beat a roll on a drum, to sound a call on the trumpet.
چالنماق	*châl-in-maq* (v. pass. and refl.) to be twisted, &c., to twist one's self, &c.
چاما	*châma* (subs.) a conjecture, KAZ.
چامالاتماق	*châma-la-'t-maq* (v. caus.) to cause to conjecture.
چامالاشماق	*châma-la-'sh-maq* (v. recip.) to conjecture together.
چامالاماق	*châma-la-maq* (v. tr.) to conjecture.
چامان	*chaman* (adj.) slow, sluggish, KAZ.
چامپان	*champan* (subs.) a branded malefactor, CHIN. [Cf. *chop* (?)].
چامغور	*chàmghur* (subs.) turnip, Y.
چانا تماق	*chana-'t-maq* (v. caus.) to cause to cut with an axe.
چاناشماق	*chana-'sh-maq* (v. recip.) to cut with axes together, or one another.
چاناق	*chanaq* (subs.) a funnel-shaped feeder of a mill.
چاناماق	*chana-maq* (v. tr.) to cut with an axe.
چانگ	*chang* (subs.) dust flying in the air.

چانگاك	*changak* (subs.) a group of hooks to which butchers hang their meat.
چانگال	*changal* (subs.) a claw, a talon.
چانگقاشماق	*changqa-'sh-maq* (v. recip.) to be thirsty in company.
چانگقاماق	*changqa-maq* (v. intr.) to be thirsty.
چاوره	*châurah* (subs.) circuit, circumference.
چاوكان	*châukan* (subs.) a young woman who has not borne a child.
چاوگون	*châu-gun* (subs.) a tea-pot (used also for the vessel in which the water is boiled).
چاي	*châi* (subs.) tea.
چايان	*chayan* (subs.) scorpion.
چاي جوش	*châi-josh* (subs.) a tea-pot [that in which the water is boiled is called "*kara* (or black) *châi-josh*"; that from which the tea is poured into the cup is called "*ak* (or white) *châi-josh*" for obvious reasons], P.
چايقاتماق	*châi-qa-'t-maq* (v. caus.) to cause to rinse out.
چايقاشماق	*châi-qa-'sh-maq* (v. recip.) to rinse out together.
چايقالماق	*châi-qa-'l-maq* (v. pass.) to be rinsed out.
چايقاماق	*châi-qa-maq* (v. tr.) to rinse out (either cups &c., or clothes after soaping).
چايناتماك	*châina-'t-mak* (v. caus.) to cause to masticate.
چايناشماك	*châïna-'sh-mak* (v. recip.) to masticate together.
چايناماك	*châïna-mak* (v. tr.) to masticate, to munch.
چَپ	*chap* (adj.) left [hand], P.
چپاغاي چپاقاي	*chapaghai* *chapaqai* } (adj. and adv.) left-handed; with the left hand, P. T.
چپّه	*chappa* (subs.) sewing-cotton.
چَخ	*chakh* (subs.) a spinning wheel, a water-wheel. [For *charkh*, P.]
چراغ	*chiragh* (subs.) a lamp, P.
چراي	*chiraï* (subs.) countenance, appearance. [? For *chehrah*, P.]

چرایسیز	*chiraï-siz* (adj.) ugly, ill-favoured.
چرایسیزلیق	*chiraï-siz-liq* (subs.) ugliness.
چرایلیق	*chiraï-liq* (subs. and adj.) beauty, handsomeness; also, well-favoured, good-looking, P. T.
چرخ	*charkh* (subs.) a wheel, a grind-stone, spinning wheel, &c., P.
چرخلاماق	*charkh-la-maq* (v. tr.) to grind (on a turning grind-stone).
چرک	*chirk* (adj.) rotten.
چرلاشماق	*chirla-'sh-maq* (v. recip.) to call one another, to invite one another.
چرلاماق	*chirla-maq* (v. tr.) to call, to invite, to summon.
چقارتماق	*chiq-âr-'t-maq* (v. redup. caus.) to cause to take out.
چقارشماق	*chiq-âr-'sh-maq* (v. caus. recip.) to take out together.
چقارماق	*chiq-âr-maq* (v. caus.) to cause to go out, *i. e.*, to take out, to send out, to expel.
چقماق	*chiq-maq* (v. intr.) to go out.
چکمان	*chak-man* (subs.) coarse woollen or cotton stuff.
چَکَن	*chakan* (subs.) embroidery, P.
چگلماك	*chig-il-mak* (v. pass.) to be knotted.
چگماك	*chig-mak* (v. tr.) to knot, to tie in a knot.
چگنگاك	*chigin-gak* (adj.) given to backing (of a horse).
چگنماك	*chigin-mak* (v. intr.) to back (of a horse), to retire, to retreat.
چوّ	*chchu*, (interj.) used for making a horse move forward.
چو	*Chu* (prop. name) a river running from near the Issik-kúl (Lake) north of the Kara Tagh Range.
چوب	*chub* (subs.) sweepings, KAZ.
چوبوق	*chübuq* (subs.) a rod [? P. *châbuq*]; also, the piece of cloth let in to the side of the skirt of a robe to give it fullness.
چوپچاک	*chupchak* (subs.) a story, a tale, KAZ.
چوپچوق	*chupchuq* (subs.) a sparrow, KAZ.
چوپور	*chupur* (subs.) goat's hair.
چوت	*chot* (subs.) a small adze, KAZ.

چوتا چوتار	*chotá* *chotár*	(subs.) coarse white cotton cloth.
چوتور	*chôtur*	(adj.) marked with small-pox.
چوجا چوچا	*chûja* *chûcha*	(subs.) a chicken, a chick.
چوچاك	*chuchak*	(subs.) a story, a tale.
چوچقا	*chochqa*	(subs.) a pig, KAZ.
چوچوک	*chüchük*	(adj.) savoury, nice-tasting, not sour.
چورتان	*chortân*	(subs.) a sort of fish with a snout resembling a duck's bill.
چورگولتماك	*churgul-'t-mak*	(v. caus.) to cause to go round.
چورگولشماک	*churgul-'sh-mak*	(v. recip.) to go round together.
چورگولماک	*churgul-mak*	(v. intr.) to go round, to revolve, to rotate.
چوره	*chaurah*	(adj.) round, disk-like. Same as *châurah*.
چوروتماک	*chürü-'t-mak*	(v. caus.) to cause to rot.
چوروق	*choruq*	(subs.). The same as *charoq*.
چوروک	*chürü'k*	(adj.) rotten.
چوروماک	*chürü-mak*	(v. intr.) to rot, to become corrupt.
چوري	*chori*	(subs.) a female slave.
چوغول	*chughul*	(adj.) slandering, making mischief.
چوغول لوق	*chughul-luq*	(subs.) slander, mischief-making.
چوق	*choq*	(subs.) a tassel, KAZ.
چوق	*choq*	(adj. and adv.) many, much; also, very.
چوق	*choq*	(subs.) a hot ember.
چوقا	*choqa*	(subs.) the back of the head.
چوقماق	*choqmaq*	(subs.) a mace, a weapon formed of a handle with a heavy head attached to it rigidly.
چوقوتماق	*choqu-'t-maq*	(v. caus.) to cause to peck.
چوقور	*chuqur*	(subs.) a pit, a depression.
چوقور	*choqur*	(adj.) marked or pitted with small-pox.
چوقوشماق	*choqu-'sh-maq*	(v. recip.) to peck one another.
چوقوماق	*choqu-maq*	(v. tr.) to peck.
چوکا	*choka*	(subs.) chop-sticks for eating Chinese fashion.

چوکارتماک	*chuk-ar-'t-mak* (v. caus. redup.) to cause to make (a camel) to lie down, to order (a camel) to be made to lie down.
چوکارشماک	*chuk-ar-'sh-mak* (v. caus. recip.) to cause (camels) to lie down in company, to make a number of camels lie down.
چوکارماك	*chuk-ar-mak* (v. caus.) to cause to sink, to cause (camels) to lie down.
چوکان	*chokan* (subs.) a young woman who has not borne a child. Same as *châukan*.
چوکتورماک	*chuk-tur-mak* (v. caus.). The same as *chuk-ar-mak*.
چوکماک	*chuk-mak* (v. intr.) to sink (in water), to lie down (of a camel).
چوکورماك	*chuk-ur-mak* (v. caus.). The same as *chuk-ar-mak*.
چول	*chul* (subs. and adj.) an arid place; arid.
چولاق	*chulâq* (adj. and subs.) maimed, mutilated, armless, handless; a man who has lost a hand or arm, &c.
چولان	*chülan* (subs.) cooked rations.
چولپان	*cholpan* (subs.) the morning star (seen in summer).
چولغاتماق	*chulgha-'t-maq* (v. caus.) to cause to wind.
چولغاشماق	*chulgha-'sh-maq* (v. recip.) to wind in company.
چولغاماق	*chulgha-maq* (v. tr.) to wind, to roll up, to entwine.
چولغانماق	*chulgha-'n-maq* (v. refl.) to twine itself.
چوللاتماک	*chul-la-'t-mak* (v. caus.) to cause to be thirsty, &c.
چوللاشماک	*chul-la-'sh-mak* (v. recip.) to be thirsty together, &c.
چوللاماک	*chul-la-mak* (v. intr.) to be thirsty, to become thirsty, to dry up, to talk one's self hoarse (or dry) [from *chul*], KH.
چوم	*chom* (subs.) a camel's pack-saddle, KAZ.
چوماق	*chomaq* (subs.) a mace. [See *choq-maq*.]
چومالي	*chumali* (subs.) an ant.
چومچوق	*chumchuq* (subs.) a sparrow.
چومدورماق	*chum-dur-mâq* (v. caus.) to cause to duck, to make (any one) take a dip (by word or gesture).
چومماق	*chum-mâq* (v. intr.) to duck (one's self under water), to take a dip, to dive.

چوموچ *chumüch* (subs.) a wooden ladle, P.

چومورماق *chum-ur-mâq* (v. caus.) to cause to duck, to dip, to duck (actively).

چومولماق *chum-ul-mâq* (v. pass. with refl. sense) [literally, to be ducked], specially, to bathe, to dip one's self.

چوناق *chunâq* (adj. and subs.) having lost an ear; one who has lost an ear.

چوناك *chunak* (subs.) a furrow for irrigation separating the several beds in a garden.

چونتاك *chuntak* (subs.) a pocket in the skirt of a robe.

چونگ *chung* (adj.) great, large, big.

چونگقايتماق *chungqaï-'t-maq* (v. caus.) to cause to squat.

چونگقايشماق *chungqaï-'sh-maq* (v. recip.) to squat together.

چونگقايماق *chungqaï-maq* (v. intr.) to squat (with the knees near the face, like the natives of India).

چوورتماك *chûwar-'t-mak* (v. caus.) to cause to invert.

چوورماك *chûwar-mak* (v. tr.) to throw over, to invert, to reverse, to turn over (entirely), to turn round (on to the opposite direction).

چووروشماك *chûwar-ush-mak* (v. recip.) to invert together.

چوورولماك *chûwar-ul-mak* (v. pass.) to be inverted, to be turned round.

چويان *chuyan* }
چويون *chuyun* } (subs.) pig-iron, also cast-iron.

چه *chah* an affix implying extent or amount; also, fashion. [See Gram. under "adverbs" and "post-positions" and "formation of adjectives." Also see under *chín*, below.]

چيان *chiân* (subs.) a scorpion. Same as *châyân*.

چيبار *chibar* (adj.) skilled, skilful, Kaz.

چيبيق *chibiq* (subs.) a rod, a wand. [See *chubuq*.]

چيبين *chibin* (subs.) a fly, a house-fly.

چيبيلدوق *chibilduq* (subs.) a curtain stretched across a room, dividing it into two.

چیپ *chep* (subs.) an intrenchment, an earth-work (to protect guns or troops).

چیت *chît* (subs.) a border, an edge, a frontier.

چیتان *chîtan* (subs.) a rough paling made of crossed sticks.

چیتّ *chitt* (subs.) a thorn fence, thorns stuck on the top of a wall.

چیتّ *chitt* (subs.) printed calico, chintz.

چیچا *chîcha* (subs.) mother, Kaz.

چیچاك *chichak* (subs.) a flower; also, small-pox.

چیچان *chichan* (adj.) eloquent, persuasive, Kaz.

چیچان لیک *chichan-lik* (subs.) eloquence, Kaz.

چیداتماق *chida-'t-maq* (v. caus.) to cause to last.

چیداشماق *chida-'sh-maq* (v. recip.) to last together.

چیداماق *chida-maq* (v. intr.) to last, to endure.

چیدامسیز *chida'm-siz* (adj.) not lasting, unenduring, impatient.

چیدام لیق *chida'm-liq* (adj.) enduring, lasting, patient.

چیرانماك *chiran-mak* (v. intr.) to make an effort (physical), to strain at any task, to groan or grunt over a hard task; to sit back in the saddle with one's feet well forward.

چیرایلوق *chiraï-lüq* (adj.) handsome, good-looking.

چیرکین *chirkin* (adj.) dirty, Kaz.

چیرلاتماق *chirla-'t-maq* (v. caus.) to cause to call.

چیرلاشماق *chirla-'sh-maq* (v. recip.) to call one another.

چیرلاماق *chirla-maq* (v. tr.) to call, to summon.

چیرماتماق *chirma-'t-maq* (v. caus.) to cause to wind, to cause to twine.

چیرماش *chirmash* (adj.) entangled.

چیرماشتورماق *chirma'sh-tur-maq* (v. recip. caus.) to cause to be entangled, to entangle, to intertwine.

چیرماششماق *chirma'sh-ish-maq* (v. recip. redup.) to be entangled together, to be intertwined.

چیرماشماق *chirma'sh-maq* (v. recip.) to wind or twine in company; to be entangled.

چیرمالماق *chirma-'l-maq* (v. pass.) to be wound, to be twined.

چيرماماق	*chirma-maq* (v. tr.) to wind (irregularly), to twine.
چيرماوق	*chirma-uq* (subs.) a creeper which winds itself round trees (dying down in winter).
چيرورتماک	*chirü-'t-mak* (v. caus.) to cause to rot.
چيروماک	*chirü-mak* (v. intr.) to rot.
چيريک	*chírik* (subs.) an army, a force.
چيريللاتماق	*chiril-la-'t-maq* (v. caus.) to cause to chirp.
چيريللاشماق	*chiril-la-'sh-maq* (v. recip.) to chirp or chirrup in chorus.
چيريللاماق	*chiril-la-maq* (v. intr.) to chirp, to chirrup, to twitter (like young birds).
چيزا	*chíza* (subs.) a measure of length (two spans of fore-finger and thumb) [now identified with the half of the *alchín* (Russian "arschine") which is about 28 inches].
چيزدورماق	*chiz-dur-maq* (v. caus.) to cause to draw lines.
چيزشماق	*chiz-ish-maq* (v. recip.) to draw lines in company.
چيزماق	*chiz-maq* (v. tr.) to draw a line or lines, to score.
چيزيق	*chiz-iq* (vl. subs.) a line, a score.
چيغ	*chigh* (subs.) a reed used for making baskets and mats; also a chick (Indian screen).
چيغرتماق	*chighartmaq* (subs.) a coarse kind of grass growing in bunches which grazing animals will not touch.
چيغريق	*chighariq* (subs.) a machine for cleaning cotton of its seeds, by passing it between two rollers one of iron and one of wood.
چيغين	*chighin* (subs.) expense, KAZ.
چيق	*chiq* (subs.) dew.
چيقارتماق	*chiq-ar-'t-maq* (v. caus. redup.) to cause to make to go out, to cause to take out.
چيقارشماق	*chiq-ar-'sh-maq* (v. caus. recip.) to cause to go out in company.
چيقارماق	*chiq-ar-maq* (v. caus.) to cause to go out, to take out, to expel.
چيقان	*chiqan* (subs.) a red eruption on the body.

چیقماق *chiq-maq* (v. intr.) to go out.

چیقیم *chiqim* (subs.) expense, expenditure.

چیکا *chika* (subs.) the temple (of the head).

چیکان *chikan* (subs.) embroidery.

چیکماک *chik-mak* (v. tr.) to embroider.

چیکماک *chik-mak* (v. tr.) to smoke.

چیکمان *chikman* (subs.) coarse cloth. The same as *chakman*.

چیکا *chiga* (subs.) vegetable fibre; a kind of wild hemp; also, a rope made of the same.

چیگماک *chig-mak* (v. tr.) to knot, to tie in a knot.

چیگورتکا *chigörtka* (subs.) a locust, a grasshopper.

چیگیت *chigit* (subs.) cotton seed.

چیگیتاك *chigitak* (subs.) the refuse of fat left after boiling.

چیلان *chilan* (subs.) a brown berry with a stone in it, not unlike the Indian *bêr*.

چیلبور *chilbur* (subs.) a picketing rein, attached to a horse's head-stall.

چیلپوللاتماق *chilpul-la-'t-maq* (v. caus.) to cause to sound by splashing.

چیلپوللاشماق *chilpul-la-'sh-maq* (v. recip.) to sound of splashing in several directions at once.

چیلپوللاماق *chilpul-la-maq* (v. intr.) said of the sound of the splashing of water; to make a sound of splashing.

چیلپیق *chilpiq* (subs.) weakness and running of the eyes.

چیلتاك *chiltak* (subs.) a fancy edging to a garment.

چیلیم *chilim* (subs.) a hookah, a hubble-bubble [made of a hollowed gourd to contain the water, in Eastern Turkistân].

چیم *chim* (subs.) a sod, a turf.

چیمچیق *chimchiq* (subs.) a sparrow.

جیمچیلاتماق *chimchi-la-'t-maq* (v. caus.) to cause to pinch.

چیمچیلاشماق *chimchi-la-'sh-maq* (v. recip.) to pinch one another.

چیمچیلاق *chimchilaq* (subs.) the little finger; *chimchilâq ana-si* 'the ring-finger' literally 'little finger's mother.'

چیمچیلاماق	*chimchi-la-maq* (v. tr.) to pinch (with the fingers, repeatedly).
چیمچیماق	*chimchi-maq* (v. tr.) to pinch (once), to give a pinch.
چین	*chin* (adj.) true, trustworthy.
چین	*chîn* (subs.) amount, extent, measure [the probable origin of the affix *chah* (which see). This latter is pronounced by the Kazzaks *chaïn* (as *tiz-ga-chaïn* for *tiz-ga-chah)*; this forms a link to connect the two].
چیناتماق	*chin-a-'t-maq* (v. caus.) to cause to tighten.
چیناتماک	*chîn-a-'t-mak* (v. caus.) to cause to measure.
چیناشماق	*chin-a-'sh-maq* (v. recip.) to tighten in company.
چیناشماک	*chîn-a-'sh-mak* (v. recip.) to measure in company.
چیناماق	*chin-a-maq* (v. tr.) to tighten, to brace up.
چینا ماک	*chîn-a-mak* (v. tr.) to measure, to estimate, to reckon (size or extent) [distinguished from *chagh-la-maq* which refers to numbers].
چینگ	*ching* (adj.) strong, firm, tight, hard.
چینگقاماق	*ching-qa-maq* (v. tr.) to tighten, to brace up. Same as *china-maq*.
چینگقرتماق	*chingqar-'t-maq* (v. caus.) to cause to scream.
چینگقرماق	*chingqar-maq* (v. intr.) to scream, to squall.
چینگلاتماق	*ching-la-'t-maq* (v. caus.) to cause to sharpen by hammering.
چینگلاشماق	*ching-la-'sh-maq* (v. recip.) to sharpen together by hammering.
چینگلاماق	*ching-la-maq* (v. tr.) to sharpen by hammering (cold) [as a horse shoe-nail before shoeing].
چین لاتماق	*chin-la-'t-maq* (v. caus.) to cause to speak truth.
چینلاشماق	*chin-la-'sh-maq* (v. recip.) to speak truth to one another, to become in earnest with one another.
چینلاماق	*chin-la-maq* (v. intr.) to speak truth, to speak in earnest, to get angry.
چینی	*chini* (subs.) china, porcelain; specially a china cup.

چییان *chiyan* (subs.) a scorpion. The same as *châyan.*

ح

حَیت *haït* (subs.) a festival, *Eed.* [Corr. A.]

حَیت لیک *haït-lik* (subs.) things prepared for the celebration of the festival; also, presents given at the festival.

خ

خاتون *khâtun* (subs.) a woman, a wife, P. (?)

خادا *khâda* (subs.) a long stake or post.

خارخشه *khârkhashah* (subs.) bother, worry.

خاسه *khâsah* (subs.) calico, shirtings.

خاسه‌لیک *khâsah-lik* (adj.) particular, special, P. T.

خافا *khâfâ* (adj.) annoyed, displeased, troubled. [Corr. P.]

خافالاتماق *khâfa-la-'t-maq* (v. caus.) to cause to annoy.

خافالاشماق *khâfa-la-'sh-maq* (v. recip.) to annoy one another.

خافالاماق *khâfa-la-maq* (v. tr.) to annoy, to vex.

خافالانماق *khâfa-la-'n-maq* (v. pass. and refl.) to be annoyed; to vex one's self.

خافالیق *khâfa-liq* (subs.) displeasure, annoyance, P. T.

خالا *khâla* (subs.) a maternal aunt, P.

خالاتماق *khâ-la-'t-maq* (v. caus.) to cause to desire.

خالاشماق *khâ-la-'sh-maq* (v. recip.) to desire together, to desire one another, or, of one another.

خالاماق *khâ-la-maq* (v. tr.) to desire, to wish for, P. T [*khâ* for *khwâh*].

خالته *khâlta* (subs.) a bag, P.

خام *khâm* (adj.) unripe, raw (in all senses), crude, unfashioned, unlaboured, P.; hence (subs.) cloth made of coarse single threads of cotton.

خامان	*khâman* (subs.) a threshing-floor or ground (where corn is trodden out); reaped corn collected for threshing, P. [for *khirman*].
خاملاتماق	*khâm-la-'t-mâq* (v. caus.) to cause to unravel, (tr.).
خاملاشماق	*khâm-la-'sh-mâq* (v. recip.) to unravel in company.
خاملاماق	*khâm-la-mâq* (v. tr.) to unravel, P. T.
خاملوق	*khâm-lūq* (subs.) immaturity, rawness.
خان	*khân* (subs.) king, prince; also used in Kâshghar as an ending for the names of women (not of men as in India) as: *Aï Khân* ("moon princess"), *Maïram Khân* ("lady Mary").
خان اريق	*Khân-ariq* (prop. name) a canal some fourteen miles south of Kâshghar, derived from the Tazghun River; also a district and town irrigated by it. [Literally the *Khân's* canal.]
خبر	*khabar* (subs.) news, intelligence, information, P.
خبرلاتماك	*khabar-la-'t-mak* (v. caus.) to cause to inform.
خبرلاشماک	*khabar-la-'sh-mak* (v. recip.) to inform one another.
خبرلاماك	*khabar-la-mak* (v. tr.) to give news, to inform [with the person in *ga*, and the news in the accusative], P. T.
خبرلانماک	*khabar-la-'n-mak* (v. pass. and refl.) to be informed; to inform one's self.
خرخر	*khar-khar* (adj.) inarticulate, indistinct in utterance.
خررات	*kharrat* (subs.) a carpenter.
خرراک	*khurrak* (subs.) a snore.
خرمن	*khirman* (subs.) corn collected for threshing; a threshing-floor, P.
خري	*khari* (subs.) the main beam of a (flat) roof, [on which the lesser cross beams from either wall rest on their ends]. (Cf. Hind. *karri* = beam.)
خواجه	*khwâja* (subs.) a title applied to the offspring of a Sâyad by a woman of any other family, also to their descendants. Also, used as a mere term of honour for addressing a superior, like "Sir," generally pronounced ***khoja***.

خوتوک	*khutuk* (subs.) a young ass.
خوتون	*khutun* (subs.). For *khâtun* (which see).
خوجه	*khoja* (subs.). For *khwâja* (which see).
خورجین	*khurjîn* (subs.) a saddle bag (double, so as to fit on each side of the horse's back), P.
خورلیق	*khur-liq* (adj.) base, contemptible. [From *khwâr*, P.]
خورللاتماق	*khurul-la-'t-maq* (v. caus.) to cause to snore.
خوروللاماق	*khurul-la-maq* (v. intr.) to snore.
خوش	*khush* (adj. and adv.) happy, well, P.
خوشامت	*khush-âmat* (subs.) sycophancy, obsequiousness, P.
خوشلاتماق	*khush-la-'t-maq* (v. caus.) to cause to make happy.
خوشلاشماق	*khush-la-'sh-maq* (v. recip.) to please one another, to please several people; to wish one another farewell.
خوشلاماق	*khush-la-maq* (v. tr.) to make happy, to please.
خوشلانماق	*khush-la-'n-maq* (v. pass. and refl.) to be made happy; to please one's self.
خوشیاقماس	*khush-yaq-mas* (adj.) unwilling, lazy.
خوشیاقماق	*khush-yaq-maq* (v. intr.) to be agreeable (of an action), to be willing (of the agent). [Little used in Eastern Turkistân.]
خوم	*khum* (subs.) a large earthenware vessel.
خومار	*khumâr* (subs.) illness or *mal-aise* resulting from the giving up of stimulants or narcotics; also, headache after drinking.
خوماري	*khumâri* (adj.) ill from giving up drink or drugs, or from the excessive use of them.
خون	*khun* (subs.) blood-money, satisfaction for the death of any one [from *khun* = blood, P.].
خونگان	*khungan* (subs.) a cucumber.
خیرا	*khira* (adj.) dim; *közi khira* = dim-eyed, *i. e.* short-sighted.
خیریللاماق	*khiril-la-maq* (v. intr.) to speak indistinctly or hoarsely (as from the effect of a goître).
خینا	*khina* (subs.) the dye called 'henna'. [Corr. A.]

د

دا *da* (post-pos) at, in (used where motion is not implied).

داب *dab* (participle). For *dep* "having said", from *dé-mak.*

داب *dab* (subs.) a spring forwards, [only used in composition, as *dab-birmak* to spring forwards, to dart forwards].

دابا *daba* (subs.). For *dâwa.*

دادا *dàda* (subs.) father. *Ugâi dàda* = step-father.

دار *dâr* (subs.) a gallows, a clothes-line (for drying clothes), P.

دارو *dâru* (subs.) medicine, drugs, spices ; gunpowder.

داغ *dâgh* (subs.) grief, sorrow ; also P., an indelible mark.

داغا *daghâ* (subs.) deception, cheating, P.

داغاباز *daghâ-bâz* (adj.) deceitful, cheating, P.

داغلاتماق *dagh-la-'t-maq* (v. caus.) to cause to brand.

داغلاشماق *dagh-la-'sh-maq* (v. recip.) to brand together. [P. T.

داغلاماق *dâgh-la-maq* (v. tr.) to mark indelibly, to brand, to tattoo,

داغلانماق *dâgh-la-'n-maq* (v. pass. and refl.) to be branded, to brand one's self.

داک *dak* (advl. affix). For *dik.*

دالان *dâlan* (subs.) an inner gateway [dividing the outer premises to which men have access from the inner courtyard in which are the women's apartments. It is formed of a kind of hall or passage with two doors, not opposite one another, so that no one can see into the inner yard, even when the doors are open].

دالو *dalu* (subs.) a shoulder-blade, the shoulder.

دانگ *dang* (subs.) a serai frequented by the poorer class of travellers, CH.

دانگ *dang* (subs.) renown.

داو *dao* (subs.). For *dâwa.*

داو *dao* (subs.) a stake laid by a looker-on at a game.

داوا *dâwa* (subs.) a claim, a lawsuit. (Corr. A.)

داوا *dawâ* (subs.) medicine. (Corr. A.)

داوان *dawân* (subs.) a pass (over mountains).

داوراتماق *dâura-'t-maq* (v. caus.) to cause to mimic.

داوراشماق *dâura-'sh-maq* (v. refl.) to mimic one another.

داوراماق *dâura-maq* (v. tr.) to mock, to mimic, to imitate.

داوروق *dâuruq* (subs.) a clamour, a hullaballoo.

داوش *dâush* (subs.) noise.

داوشلاتماق *dâush-la-'t-maq* (v. caus.) to cause to make a noise.

داوشلاشماق *dâush-la-'sh-maq* (v. recip.) to make a noise together, or to one another.

داوشلاماق *dâush-la-maq* (v. tr.) to make a noise.

داي *dâi* (advl. affix). For *dak* or *dik*, KAZ.

دايين *dâyin* (advl. affix). For *dak* or *dik*, KH.

درحال *dar-hâl* (adv.) at once, on the spot, P. (literally, in the condition of affairs).

درراو *dar-rao* (adv.) while in the act, immediately, P.

درك *darak* (subs.) cognizance, perception (concrete), *darak tâptim* "I have become aware," P.

درکار *dar-kâr* (adj.) necessary, required, P. (literally, in the work).

درکارليق *dar-kâr-liq* (subs.) a necessary, a requisite, P. T.

درکلاتماک *darak-la-'t-mak* (v. caus.) to cause to inquire.

درکلاشماك *darak-la-'sh-mak* (v. recip.) to inquire of one another, or, together.

درکلاماک *darak-la-mak* (v. tr.) to inquire, to endeavour, to become cognizant.

دزمال *dazmal* (subs.) a flat iron (for smoothening linen).

دسترخان *dastar-khân* (subs.) a table-cloth (spread on the floor for eating); also, what is placed thereupon, a spread, a feast. [The *dastar-khân* is quite an institution in Turkistân, hospitality requiring that one should be put before a guest on every possible occasion quite regardless of regular meal-times. First bread, fruit and sweetmeats are put on the cloth, afterwards meat *entrées* of different kinds, then huge dishes of *pilao,* and then cups full of soup.] (For *dastâr-khwân),* P.

دسترخانچي *dastar-khân-chi* (subs.) the chief servant who lays the cloth and puts the dishes on it, one by one, taking them from the hands of the other attendants. Also, an officer at the Court of Khokand who enjoys the revenues of a certain district subject to the duty of providing the requisites for the *Khân's* guests.

دستک *dastak* (subs.) a written order of any one in authority, P.

دستمال *dast-mal* (subs.) a handkerchief, a towel, P.

دستورخان *dastur-khân* (subs.). For *dastar-khân.*

دسلاب *daslab* (subs.) beginning, commencement.

دسمال *dasmal* (subs.). For *dast-mal,* P.

دسمایه *dasmâya* (subs.) capital (of money) [for *dast-mâya*], P. [As rigid Musalmáns consider it wrong to receive interest on their capital, they arrange as follows: they advance a certain sum to the borrower who is considered their trading agent; of the profit that accrues (after deduction and repayment of the capital) two-thirds go to the capitalist and one-third to the borrower (the latter having deducted his own cost of maintenance meanwhile out of the undivided profit). Another arrangement is that the capitalist takes only half the profits, but the agent or borrower bears his own expenses. Losses are borne, on the second plan by both in the proportion of 2 to 1; and on the first plan by the capitalist.]

دم *dam* (subs.) breath, steam, P.

دمالدورماق *dam-âl-dur-mâq* (v. caus.) to cause to take breath.

دمالشماق *dam-âl-ish-mâq* (v. recip.) to take breath, or rest, together; or in turns.

دمالماق *dam-âl-mâq* (v. intr.) to take breath, to rest, P. T.

دمبورا	*dambura* (subs.) a two-stringed guitar, Kaz.
دملاتماک	*dam-la-'t-mak* (v. caus.) to cause to cook by steam.
دملاشماک	*dam-la-'sh-mak* (v. recip.) to steam together; also, for *dam-al-ish-mak*, in the sense of rest by turns in any task, to work 'in tie,' to carry by turns.
دملاماک	*dam-la-mak* (v. tr.) to steam, to cook in steam [by shutting the top of the vessel, as with a tea kettle; or by placing the pastry, &c. to be cooked, on a wooden grating fixed some distance above the surface of boiling water in the inside of a large closed vessel].
دن	*dan* (post-pos.) from, than.
دنیا	*dunyâ* (subs.) the world; also, wealth, riches, A.
دنیادار	*dunyâ-dâr* (adj.) wealthy, rich, A. P.
دوبه	*duba* (subs.) a mound, a hillock. Same as ***tipah***.
دوتار	*dutâr* (subs.) a two-stringed lute [*du-târ* as distinguished from *si-târ* = "three-stringed," a guitar], P.
دور	*dur* Present auxiliary tense (see Grammar under "Verbs"). Probably a corruption of *turur* (which often occurs in its place in old writings) the Present Future of *tur-mak* "to stand."
دوری	*dauri* (subs.) rule, reign, the time of any king's rule, P.
دوشه	*dusha* (subs.) a board for chopping meat on.
دول	*dul* (adj.) hump-backed.
دولان	*Dolan* (prop. name) the plains of the Yarkand River from two marches east of Yarkand to within some seven marches of Aksu; also, their inhabitants. They are great reverers of the saintly family of the Kâshghar Khojas.
دولت	*daulat* (subs.). For *dâulat* (which see).
دول	*dôl* (subs.) the funnel-shaped feeder of a mill.
دولی	*doli* (subs.) the shoulder-blade, the shoulder [for *dâlu*].
دومباق	*dumbâq* (subs.) a drum.
دون	*dawan* (subs.) a pass over a mountain range [for *dawân*].
دونان	*dunan* (adj.) two-year-old.

دونبول *dunbul* (adj.) unripe (of corn).

دونبه *dunba* (subs.) a broad sheep's tail (of the sort common [in Central Asia).

دونگ *dung* (subs.) rising ground.

دیب *deb* [pronounced *dip*] (part.) having said, saying. [This closes almost every quotation or even statement of what passed in the mind of any one, answering nearly to our "that" at the beginning. E. g. *barái dip kupti* "he arose that he might go" (literally "let me go, so saying, he arose"); *shubu dip tunudim* "I recognised that it (was) he" (literally "he, so saying, I recognised").]

دیپساتماک *dipsa-'t-mak* (v. caus.) to cause to tread down.

دیپساشماق *dipsa-'sh-maq* (v. recip.) to tread down together.

دیپساماک *dipsa-mak* (v. tr.) to tread down, to tread in.

دیداک *dédak* (subs.) a female slave.

دیدورماک *dé-dur-mak* (v. caus.) to cause to say.

دیساکچي *désak-chi* (subs.) a night watchman.

دیک *dik* (adjl. and advl. affix) like; similarly to. [This is affixed to words or even subordinate sentences; governing generally the genitive of pronouns, the future participle of verbs, but the simple radical of other words.] (? Verbal form from *dé-mak* "to say", *dek* "what is spoken", *quasi* "so to speak;" as *pitik* "what is written", from *pit-mak* "to write".)

دیگوچي *dé-gu-chi* (subs.) a speaker, one who says [from the fut. part. of *dé-mak*].

دیماک *dé-mak* (v. tr.) to say.

دین *din* (post-pos.) from, than.

دیوانه *diwána* (adj. and subs.) mad; a madman; also, a mendi[cant, a dervesh, a beggar, P.

ر

رابات *rabat* (subs.) a rest-house.

راباق *rabaq* (subs.) a palace, the private dwelling of a Ruler, [for *rawaq*, A.].

راس *râs* (adj.) straight, right [for *râst*, P.].

راسلاتماق *râs-la-'t-mâq* (v. caus.) to cause to discharge (a payment).

راسلاشماق *râs-la-'sh-mâq* (v. recip.) to discharge together.

راسلاماق *râs-la-mâq* (v. tr.) to complete a number, to discharge a payment, to set right, to set in order. (?) P. T.

رمبال *rambal* (subs.) a soothsayer, P.

رنگ *rang* (subs.) colour, appearance, species, P.

رنگلاتماک *rang-la-'t-mak* (v. caus.) to cause to dye.

رنگلاشماک *rang-la-'sh-mak* (v. recip.) to dye together.

رنگلاماک *rang-la-mak* (v. tr.) to colour, to dye, P. T.

رنگلانماک *rang-la-'n-mak* (v. pass. and refl.) to be, or, become coloured; to assume a colour.

رنگلانیشماک *rang-la-'n-ish-mak* (v. refl. recip.) to become coloured in company; to paint their faces in company (of women).

رنگلیک *rang-lik* (adj.) coloured, bright coloured, handsome, P. T.

روده‌پای *rudah-paï* (subs.) a persistent, or, importunate person; an incubus, an old man of the sea, P.

روزه *rozah* (subs.) a fast, the month Ramazân, P.

رومال *rumal* (subs.) a napkin, a towel, a handkerchief [from *ru* "face" and *malidan* "to wipe," P.].

رویان *ruyan* (subs.) madder (a dye), Kh. P.

ز

زا *zâ* (subs.) trouble, annoyance [for *iza*, A.].

زاغ *zâgh* (subs.) a jackdaw.

زاغچه *zâghchah* } (subs.). The same, Kh.
زاقچه *záqchah* }

زاغون *zaghun* (subs.) mustard [only used for extracting oil].

زاماروق *zamaruq* (subs.) a root eaten cooked in milk [in Wakhan, Badakhshan, &c.].

زغیر *zaghir* (subs.) linseed, flax (grown only for the oil).

زمبرک *zamburak* (subs.) a gun, a piece of artillery.

زنجیر	*zanjir* (subs.) a chain, P.
زنجیرلاتماک	*zanjir-la-'t-mak* (v. caus.) to cause to put in chains.
زنجیرلاشماک	*zanjir-la-'sh-mak* (v. recip.) to chain together.
زنجیرلاماک	*zanjir-la-mak* (v. tr.) to chain, to put in chains, to chain up (as a door), P. T.
زنجیرلانماک	*zanjir-la-'n-mak* (v. pass.) to be enchained.
زنگ	*zang* (subs.) rust.
زنگبرک	*zangbarak* (subs.). The same as *zamburak*.
زنگلاتماک	*zang-la-'t-mak* (v. caus.) to cause to rust, to allow to rust.
زنگلاماک	*zang-la-mak* (v. intr.) to rust, to become rusty.
زور	*zôr* (subs.) strength, force, violence, P.
زورلاتماق	*zôr-la-'t-mâq* (v. caus.) to cause to use force, or, violence.
زورلاشماق	*zôr-la-'sh-mâq* (v. recip.) to use force together, to exert themselves together, or, against one another.
زورلاماق	*zôr-la-mâq* (v. tr.) to use force to, to use violence to, P. T.
زورلیق	*zôr-liq* (subs. and adj.) force, violence ; strong, violent.
زولان	*zôlan* (subs.) fetters.
زیریکتورماك	*zerik-tur-mak* (v. caus.) to cause to be wearied, to cause irksomeness.
زیریکیشماک	*zerik-ish-mak* (v. recip.) to be wearied (of anything) together.
زیریکماک	*zerik-mak* (v. intr.) to be wearied, to feel (anything) irksome.
زیغیر	*zighir* (subs.). The same as *zaghir*.
زیلچاق	*Zilchaq* (prop. name) a small river or canal a few miles south of Yárkand.
زیلچه	*zilchah* (subs.) a long-pile carpet, a Turkey carpet.

س

سا	*sâ* (subs.) a kite [bird].
ساباق	*sabaq* (subs.) instruction, a lecture. [Corr. A.].
ساپ	*sâp* (subs.) the handle of an axe, spade, &c.

ساپاق	*sapaq* (subs.) the eye of a button (formed of wire).
ساپاقلاداق	*sapaq-la-maq* (v. tr.) to make an eye to a button.
ساپماق	*sap-maq* (v. tr.) to thread (a needle), to string (beads).
ساپون سابون	*sapun* *sabun* } (subs.) soap, A.
ساتدورماق	*sat-tur-maq* (v. caus.) to cause to sell.
ساتشماق	*sat-ish-maq* (v. recip.) to sell together.
ساتماق	*sát-mâq* (v. tr.) to sell, to give in barter.
ساتیپالماق	*sât-ipâl-mâq* (v. tr.) to buy, [literally, to take by purchase].
ساتیقسیز	*sat-iq-siz* (vl. adj.) unsold.
ساتیقلیق	*sât-iq-liq* (vl. adj.) sold.
ساتیلماق	*sât-il-mâq* (v. pass.) to be sold.
ساچ	*sach* (subs.) a starling.
ساچ	*sach* (subs.) hair of the head, KH.
ساچاق	*sachaq* (subs.) a tassel. [For *chachaq*.]
ساچقان	*sachqan* (subs.) a rat, a mouse. Also, the name of one of the years of the Turki cycle.
ساچتورماق	*sach-tur-maq* (v. caus.) to cause to sow (seed).
ساچشماق	*sach-ish-maq* (v. recip.) to sow in company.
ساچماق	*sach-mâq* (v. tr.) to sow (seed). The same as *chachmaq*.
ساچیلماق	*sach-il-mâq* (v. pass.) to be sown.
ساراتماق	*sâra-'t-maq* (v. caus.) to cause to sing (as a bird).
ساراشماق	*sâra-'sh-maq* (v. recip.) to sing together (as birds).
ساراغ	*sârâgh* (vl. subs.) a bird's song.
ساراماق	*sâra-maq* (v. intr.) to sing [said only of birds]. For *saïra-maq*.
سارانگ	*sarang* (adj.) mad, insane.
ساراي	*saraï* (subs.) a caravansarai, a place in a town where traders with their cattle put up, P.
سارت	*Sârt* (prop. name) a term applied by the nomads (Kirghiz, Kazzaks, &c.) to dwellers in settled habitations, whether Turks or Tâjiks, *i. e.*, whether Turanians or Iranians.

سارغارماق *sarigh-ar-maq* (v. intr.) to become yellow.

سارغایتماق *sarigh-aï-'t-maq* (v. caus.) to cause to become yellow.

سارغایشماق *sarigh-aï-'sh-maq* (v. recip.) to become yellow together.

سارغایماق *sarigh-aï-maq* (v. intr.) to become yellow.

سارغو *sarghu* (adj.) deaf.

ساري *sari* (advl. affix) as, in the measure of [after the Indefinite Verbal Substantive].

ساریغ *sârigh* }
ساریق *sâriq* } (adj.) yellow.

ساریغ ارت *Sarigh-ôt* (prop. name) literally 'yellow grass.' The name of a plain near the Karakoram.

ساریغ آیغور *Sarigh-Aïghur* (prop. name) a place mentioned in the Tawarikh-i-Rashîdi as in the direction of Lake Lob. There is at the present day a hill near Karashahr called Aïghur-Taghi. This seems to have been the home of Uïghurs [Aïghur means "a stallion"].

ساریغ چوپان *Sarigh-Chopan* (prop. name) a stage on the road between Sariqol and Wakhan (nearest the latter). Mentioned in the Tawarikh-i-Rashîdi, and by modern travellers.

ساریق قول *Sàriq-qol* (prop. name) a wide valley and district on the east of Pamir in the dominions of Kàshghar. [Often spelt at the present day ساریقول *Sàriqol.*] The name is derived from *Sàriq* "yellow," and *qol* (which see), the Kirghiz name for a wide valley (distinguished from *jilgha* "a gorge"). The name has been wrongly supposed to be that of a Lake, after the manner of *Issigh-kül* اسیغ کول "Hot Lake," which is formed with *kül* "lake" (spelt with a different guttural and pronounced with a different vowel). *Sàriqol* is only one of a series of similar compounds, used in this region, and should not be divorced from them; *e. g.*, *Sarigh-Chopan*, *Sarigh-Aïghur*, *Sarigh-ôt*, *Sàriqîa;* on the other hand its second element is found again in *King-qol* "wide valley." See *qol*.

ساريقيا *Sàriqía* (prop. name) literally, 'yellow slant.' Name of a part of the Qaraqàsh Valley.

ساز *sâz* (subs.) a marsh.

ساز *saz* (subs.) any musical instrument, P.

سازا *saza* (subs.) punishment, P.

سازان *sazan* (subs.) a species of fish, Kaz.

سازلاتماق *sâz-la-'t-mâq* (v. caus.) to cause to tune.

سازلاشماق *sâz-la-'sh-mâq* (v. recip.) to tune up together.

سازلاماق *sâz-la-maq* (v. tr.) to tune, to bring into tune, P. T.

سازليق *sâz-liq* (subs.) harmony (chiefly used metaphorically), P. T.

ساسيتماق *sâsi-'t-maq* (v. caus.) to cause to be putrid.

ساسيشماق *sâsi-'sh maq* (v. recip.) to be putrid together.

ساسيغ *sâsigh* }
ساسيق *sâsiq* } (vl. adj.) putrid, stinking.

ساسيغليق *sasigh-liq* (vl. subs.) putridity, stinkingness.

ساسيماق *sâsi-maq* (v. intr.) to putrefy, to be putrid, to stink.

ساغ *sâgh* (subs.) wellness, happiness.

ساغداق *saghdâq* (subs.) a bow.

ساغراغو *saghraghu* (adj.) deaf.

ساغري *sâghri* (subs.) a leather prepared from horse-skin (from the back of the horse) [? shagreen].

ساغز *saghiz* (subs.) fine clay.

ساغزغان *saghizghan* (subs.) a magpie.

ساغليق *saghliq* (subs.) a ewe.

ساغم *saghim* (subs.) mirage, distorted and magnified objects as seen through the heated atmosphere near the ground.

ساغماق *saghmaq* (v. tr.) to milk.

ساغو *saghu* (subs.) a wooden butt or pail.

ساغين *saghin* (adj.) giving milk, 'milch.'

ساغينيشماق *saghin-ish-maq* (v. recip.) to yearn for one another.

ساغينماق *saghin-maq* (v. tr.) to yearn for (a person).

سافال *safâl* (adj.) of earthenware.

سافاق *safâq*. For *sapak* (which see).

سافاقلاماق *safâq-la-maq*. For *sapaqlamaq*.

سافماق *saf-maq*. For *sapmaq*.

ساق *sâq*. For *sagh*.

ساقا *sâqâ* (subs.) a playing marble.

ساقال *sâqâl* (subs.) a beard.

ساقالدروق *saqalduruq* (subs.) the throat-strap of a horse's head stall.

ساقايتماق *saq-aï-'t-maq* (v. caus.) to cause to be well or happy.

ساقايماق *sâq-aï-maq* (v. intr.) to be well or happy.

ساقلاتماق *saqla-'t-maq* (v. caus.) to cause to be taken care of, to entrust.

ساقلاشماق *saqla-'sh-maq* (v. recip.) to take care of one another.

ساقلاماق *saqla-maq* (v. tr.) to take care of; also, to wait for.

ساقه *sâqa*. The same as *sâkâ*.

ساكسان *saksan* (num.) eighty. [From *sakiz* "eight" and *un* "ten".]

ساكسانايلان *saksan-aïlan* (num. subs.) a group of eighty.

ساكسانچي *saksan-inchi* (num. adj.) eightieth.

ساكساول *saksaul* (subs.) a sort of heavy wood which burns without wasting, retaining its shape until after it has become a glowing mass all through.

ساكيز *sakiz* (num.) eight.

ساكيزايلان *sakiz-aïlan* (num. subs.) a group of eight.

ساكيزنچي *sakiz-inchi* (num. adj.) eighth.

سالبراتماق *salbira-'t-maq* (v. caus.) to cause to dangle, to cause to be of uneven length.

سالبراشماق *salbira-'sh-maq* (v. recip.) to dangle together, to be of uneven length together.

سالبراماق *salbira-maq* (v. intr.) to dangle (as a rope); to be of uneven length (as stirrups, or the two sides of a robe).

سالدورماق *sâl-dur-mâq* (v. caus.) to cause to throw.

سالشماق *sâl-ish-maq* (v. recip.) to throw together.

سالغو *sâl-ghu* (subs.) a sling, a throwing instrument.

سالقين *salqin* (adj.) cool, temperate, moderately warm.

سالما *sâlma* (subs.) drift wood.

سالماق *sâl-maq* (v. tr.) to throw (gently), to throw off (as clothes), to pour, to put in, to lay out (as a wall, &c.).

سالينچاق *salinchaq* (subs.) any thing put on as an ornament, *e. g.*, a necklace, &c.

ساماوار *samawâr* (subs.) a tea-urn; Russian *samovar*.

سامسا *samsa* (subs.) a small baked meat dumpling.

سامسو *samsu* (subs.) a glazed cotton stuff, [now made in Khotan, but formerly imported from China], Ch.

سان *sân* (subs.) total, amount; used by the Kazaks for ten krors (10,00,00,000).

سان *sân* (subs.) the thigh.

ساناتماق *san-a-'t-maq* (v. caus.) to cause to count.

ساناچ *sanach* (subs.) an entire goat skin used as a bag for flour, &c.

ساناشماق *san-a-'sh-maq* (v. recip.) to count together.

ساناغ *sanâgh* } (subs.) account, number.
ساناق *sanâq* }

سانالماق *san-a-'l-maq* (v. pass.) to be counted.

ساناماق *san-a-maq* (v. tr.) to count, to reckon.

سانجيق *sanjiq* (subs.) an acute pain in the stomach [from the following].

سانجيماک *sanji-mak* (v. tr.) to stab, to prick, to pierce, to spear.

ساندال *sandâl* (subs.) an anvil.

ساندوق *sanduq* (subs.) a box. For صندوق P.

سانسيز *sân-siz* (adj.) countless, uncounted; also, of no account.

سانگراغو *sangraghu* (adj.) deaf.

سانگراو *sangraù* (adj.) deaf, Kaz.

سانگوللاماک *sangul-la-mak* (v. intr.) to dangle, to hang loose.

ساورتماق *saùr-'t-maq* (v. caus.) to cause to winnow.

ساوروشماق *saùr-ush-maq* (v. recip.) to winnow in company.

ساورماق *saùr-maq* (v. tr.) to winnow (grain).

ساوروماق *saùru-maq*. The same.

ساوغات *saughat* (subs.) a present, a keepsake, P.

ساوق *saôq* (adj.) cold, [in form derived from *saô-maq*].

ساوتلوق	*saôt-luq* (subs.) cold, coldness.
ساوتماق	*saô-'t-maq* (v. caus.) to cause to be cold, to cool (tr.).
ساوشماق	*saô-'sh-maq* (v. recip.) to be cold together.
ساوماق	*saô-maq* (v. intr.) to be cold, to become cold, to cool (intr.).
ساي	*sâï* (subs.) a desert plain; *sâï-kûk* "a desert gazelle."
ساي	*sâi* (subs.) a gorge, a ravine, a river-bed, KAZ.
ساياق	*sayâq* (subs.) a mare which will not consort with the herd, KAZ. Also, the name of a Kirghiz tribe.
سايلاق	*sâï-laq* (adj.) desert, barren.
سايلاتماق	*saï-la-'t-mâq* (v. caus.) to cause to select.
سايلاشماق	*saï-la-'sh-mâq* (v. recip.) to select together.
سايلاماق	*saï-la-mâq* (v. tr.) to select, to pick out.
سايلانماق	*saï-la-'n-mâq* (v. pass.) to be chosen, or selected.
سايماق	*saï-maq* (v. tr.). For *sanjimak*, KHIRGIZ.
سباق	*sabaq* (subs.) instruction. (Corr. A.)
سپاق	*sapaq* (subs.). The same as ساپاق.
سپاى	*sipâï* (subs.) a soldier. For *sipahi*, P.
سپورتماك	*sipur-'t-mak* (v. caus.) to cause to sweep.
سپورماك	*sipur-mak* (v. tr.) to sweep.
سپورگي	*sipur-gi* (subs.) a broom, a brush.
سپيل	*sapîl* (subs.) a fortification, a battlement. For *safîl*.
ست	*sat* (adj.). ugly.
ستماق	*süt-maq* (v. tr.) [prond. almost *sit-maq*] to extrude the contents of an egg, the brain, &c.
ستيلماق	*süt-il-maq* (v. pass.) to be extruded, to ooze out.
سچوك	*sachuk* (adj.) sweet-toned.
سراى	*sarai* (subs.) a rest-house for travellers in a town, P.
سرباز	*sar-bâz* (subs.) an infantry soldier [literally "one who stakes his head,"] P.
سرپاى	*sarpaï* (subs.) a full dress of honour (including turban or cap, robe and boots). For *sar-o-pai*, P.
سرچي	*sür-chi* [prond. almost *sirchi*] (subs.) a painter and gilder, a painter of patterns on a wall.

سردار	*sardâr* (subs.) a high officer charged with some particular employ, P.
سردورماك	*sür-dür-mak* (v. caus.) to cause to purge (as a draught).
سركا	*sirka* (subs.) vinegar, P.
سركار	*sarkâr* (subs.) an official (of great or small degree) charged with the duty of collecting and re-distributing or accounting for the revenues in kind, of a large or small district or village under the orders of its governor or head-man; also with all the works of making up or repair of moveable Government property, such as clothing, furniture, &c., P.
سركرده	*sar-kardah* (subs.) a high official entrusted with any particular function, P.
سرگي	*sürgi* (subs.) a purging draught.
سرماك	*sür-mak* (v. intr.) to be purged (in consequence of a draught).
سفيل	*safîl* (subs.) a fortification, a battlement.
سقال	*saqâl* (subs.) a beard.
سقتورماق	*süq-tür-mâq* (v. caus.) to cause to squeeze.
سقشماق	*süq-ish-mâq* (v. recip.) to squeeze in company, to squeeze one another (by the throat).
سقماق	*süq-mâq* [prond. almost *siq-mâq*] (v. tr.) to squeeze to express (juice, &c.).
سكراتماك	*sakra-'t-mak* (v. caus.) to cause to jump close-footed.
سكراشماك	*sakra-'sh-mak* (v. recip.) to jump together.
سكراماك	*sakra-mak* (v. intr.) to jump close-footed, to hop.
سكز	*sakiz* (num.) eight.
سكزايلان	*sakiz-aïlan* (num. subs.) a group of eight.
سكزنچي	*sakiz-inchi* (num. adj.) eighth.
سكسن	*saksan* (num.) eighty [*sakiz* "eight" and *un* "ten"].
سَلّه	*salla* (subs.) a turban.
سَن	*san* (pron.) thou.

سُن	*sün* [prond. almost *sin*] trial, experience.
سُناتماق	*sün-a-'t-maq* (v. caus.) to cause to try.
سُناشماق	*sün-a-'sh-maq* (v. recip.) to try one another, or in company.
سُناغليق	*sün-a'gh-liq* (vl. adj.) tried, proved.
سُناماق	*sün-a-maq* (v. tr.) to try, to prove, to make experiment.
سُنچي	*sün-chi* (subs.) a trier, an examiner.
سُندورتماق	*sün-dür-'t-maq* (v. caus. redupl.) to cause to break (tr.), to cause to make broken.
سُندورماق	*sün-dür-maq* (v. caus.) to cause to become broken, to break (tr.). [Also *sün-dür-üsh-mâq*, &c.]
سُنلاماق	*sün-la-maq* (v. tr.) to try, to prove [same as *sün-a-maq*].
سُنماق	*sün-mâq* (v. intr.) to break, to become broken ; [also *sün-üsh-mâq*, &c.].
سنيق	*sün-iq* (vl. adj.) broken, in a broken state.
سو	*sû* (subs.) water, a stream [the latter sense in composition chiefly, as *ak-su* "white stream or water," *kizil-su* "red stream or water"].
سوانماق	*su-a-'t-maq* (v. caus.) to cause to anoint.
سواشماق	*su-a-'sh-maq* (v. recip.) to anoint together, to anoint one another.
سوالماق	*sû-a-l-maq* (v. pass.) to be anointed.
سوالماق	*sû-al-maq* (v. intr.) to run dry (said of a cow in milk).
سواماق	*sû-a-maq* (v. tr.) to spread any liquid or semi-liquid over a surface, to anoint, to smear, to plaster.
سوانماق	*sû-a-'n-maq* (v. refl.) to anoint one's self.
سوباماق	*sû-ba-maq*. The same as *sûamaq* [also *subatmaq*, *subashmaq*, &c.].
سوت	*süt* (subs.) milk.
سوچوک	*süchük* (adj.) sweet (not bitter or sour).
سوچي	*sû-chi* (subs.) a water-carrier. [P. T.
سوداگرچيليق	*saudagar-chi-liq* (subs.) the profession of a merchant,

سودراتماک	*sudra-t-mak* (v. caus.) to cause to drag.
سودراشماک	*sudra-'sh-mak* (v. recip.) to drag one another, or together.
سودرالماک	*sudra-'l-mak* (v. pass.) to be dragged.
سودراماك	*sudra-mak* (v. tr.) to drag.
سودرانماك	*sudra-'n-mak* (v. refl.) to drag one's self, to be dragging (as a rope behind a cart).
سوراتماق	*sûra-'t-maq* (v caus.) to cause to ask.
سوراشماق	*sûra-'sh-maq* (v. recip.) to ask one another, or in company.
سوراق	*sûra'q* (vl. subs.) inquiry into the rights of a matter, justice.
سورام	*süra-'m* (subs.) harrow.
سوراماق	*sûra-maq* (v. tr.) to ask, to inquire; also, to rule, to have jurisdiction.
سوراماک	*süra-mak* (v. tr.) to drag.
سورتتورماک	*sürt-tür-mak* (v. caus.) to cause to wipe.
سورتماك	*sürt-mak* (v. tr.) to wipe, Kh.; to smear, Y.
سورتوشماک	*sürt-üsh-mak* (v. recip.) to wipe in company.
سورگو	*surgu* (subs.) a purging draught.
سورماق	*sûr-mâq* (v. tr.) to ask. The same as *sura-maq*.
سورماک	*sür-mak* (v. tr.) to drive together (sheep, &c.).
سوروشماک	*sür-üsh-mak* (v. recip.) to drive together in company, to drive one another alternately backwards and forwards (as cattle fighting).
سوروک	*sürük* (subs.) a flock, a herd [from *sürmak*].
سورون	*sürün* (subs.) a Royal assembly, a King's Court.
سورونچاك	*sür-ün-chak* (adj.) stumbling, given to stumbling.
سورونماک	*sür-ün-mak* (v. refl.) to stumble [qu. to drive one's self together].
سوز	*söz* (subs.) a word, a speech; also, any written matter.
سوزاک	*sözaq* (subs.) venereal disease.
سوزدورماک	*süz-dür-mak* (v. caus.) to cause to strain (through a cloth, &c.).
سوزگو	*süz-gü* (subs.) a strainer, a cullender.
سوزگوچ	*süzgüch* (subs.) a small-toothed comb (with a rib in the middle).

سوزلاتماك	*söz-la-'t-mak* (v. caus.) to cause to speak.
سوزلاشماك	*söz-la-'sh-mak* (v. recip.) to speak together.
سوزلاماك	*söz-la-mak* (v. tr.) to speak, to say, to talk.
سوزلانماك	*söz-la-'n-mak* (v. refl.) to talk to one's self.
سوزماك	*süz-mak* (v. tr.) to strain, to filter; to remove solids from a saucepan.
سوزولماك	*süz-ül-mak* (v. pass.) to be strained, or filtered.
سوغارتماق	*sû-ghar-'t-maq* (v. caus.) to cause to water.
سوغارشماق	*sû-ghar-'sh-maq* (v. recip.) to water in company.
سوغارماق	*sû-ghar-maq* (v. tr.) to water (the ground or a horse).
سوغو	*sû-ghu* (subs.) a water-pail.
سوغوچاق	*sû-ghu-chaq* (subs.) a small pail; also the name of a tank in the city of Yarkand.
سوغورتماق	*sughur-'t-mâq* (v. caus.) to cause to draw out.
سوغورماق	*sughur-mâq* (v. tr.) to draw out (any long object as a sword from the scabbard, or a stick from a faggot).
سوغوروشماق	*sughur-ush-mâq* (v. recip.) to draw out in company, to draw (swords) on both sides.
سوغوق	*sughoq* (adj.) cold.
سوف	*sûf* (subs.) fine linen or cotton-cloth.
سوفا	*sûfa* (subs.) a raised platform for sitting on; origin of our 'sofa,' P.
سوفي	*sufi* (subs.) a recluse, a religious man, A.
سوق	*suq* (subs.) the stroke of the evil eye.
سوقتا	*soqta* (subs.) black puddings (the blood of animals filled into sausages; used in feeding dogs), Kaz.
سوقتورماق	*soq-tur-maq* (v. caus.) to cause to strike.
سوقماق	*soq-maq* (v. tr.) to strike.
سوقماق	*suq-maq* (v. tr.) to sheathe, to pass any long object into a receptacle.
سوقور	*sokûr* (adj.) blind, Kaz.
سوقوش	*soqush* (v. subs.) a fight, a striking [from *soqmaq*].
سوقوشماق	*soq-ush-maq* (v. recip.) to strike one another, to fight.

سوقولماق	*soq-ul-maq* (v. pass.) to be beaten.
سوقوم	*soqum* (subs.) a fat ox.
سوک	*suk* (subs.) millet cleaned of its husk.
سوکا	*suka* (subs.) an ear-ring.
سوکسوك	*suksuk* (subs.) a tree used for fuel. The same as *saksaul*.
سوكماك	*suk-mak* (v. tr.) to scold, or vituperate.
سوكماك	*suk-mak* (v. tr.) to undo a seam.
سوكوش	*sukush* (subs.) abuse, vituperation.
سوكوشماك	*suk-ush-mak* (v. recip.) to scold or abuse one another.
سوكوشماك	*suk-ush-mak* (v. recip.) to undo a seam together.
سوكولماك	*suk-ul-mak* (v. pass.) to be scolded.
سوكولماك	*suk-ul-mak* (v. pass.) to be undone (of a seam).
سوگات	*sugat* (subs.) a willow tree. Also the name of a place (where these trees grow) and of a Pass, in the Kuen-Lun (near Shahid-ullah).
سوگال	*sugal* (subs.) a wart.
سول	*sol* (adj.) left [hand].
سولاغاي	*sol-aghaï* (adj.) left-handed.
سولاق	*su-laq* (subs.) a watering-place for cattle.
سولاق	*sula'q* (subs.) a house in which cattle or sheep are kept.
سولاقاي	*sulaqai* (adj.). The same as *solaghaï*.
سولاقماق	*sula-'q-maq* (v. intr.) to be enclosed, or shut up (in any place).
سولاماق	*sula-maq* (v. tr.) to enclose, to shut up.
سولاماق	*su-la-maq* (v. tr.) to water (either cattle or the ground).
سولو	*sulu* (subs.) breath, KAZ.
سولوق	*suluq* (subs.) a bit (horse's).
سولوق	*su-luq* (subs.) a waterproof, or garment to ward off the rain.
سولوقشماق	*sulu'q-üsh-maq* (v. recip.) to be enclosed together or at the same time.
سولوقماق	*sulu'q-maq* (v. intr.) to be enclosed.
سوليق	*suliq*. For *suluq* (both senses).

سوم	*sum* (adj.) thick, massive.
سومورتماك	*sum-ur-'t-mak* (v. caus.) to cause to become fat, to fatten (tr.).
سومورماك	*sum-ur-mak* (v. intr.) to become fat.
سوموروشماك	*sum-ur-ush-mak* (v. recip.) to become fat together.
سونگ	*sung* (post-pos.) after, behind [governs the affix *din*]. Also absolutely as an adverb, Kaz., Kh.
سونگاچ	*sungach* (subs.) the *os coccygis.*
سونگاق	*sungaq* (subs.) a bone.
سونگالچاق	*sungalchaq* (subs.) the heel-bone.
سونگپیاز	*sung-piâz* (subs.) a leek, Ch. P.
سونگرا	*sung-ra* (post-pos. and adv.). The same as *sung*, Kaz., Kh.
سونگغی	*sung-ghi* (adj.) hinder, aftermost, following.
سونگوچ	*sunguch* (subs.) a culvert, a hole for the escape of water, Y.
سونگور	*sungur* (subs.) a tendon.
سونگورتماك	*sung-ur-'t-mak* (v. caus. redup.) to cause to absorb, to cause to digest.
سونگورماك	*sung-ur-mak* (v. caus.) to absorb, to digest, [literally, to cause to be absorbed or digested]. See *singurmak.*
سونگوروشماك	*sung-ur-ush-mak* (v. caus. recip.) to absorb or digest together.
سونماق	*sun-maq* (v. tr.) to stretch, to extend (a limb), *sun-up yetmak* to reach (by stretching out a limb).
سونوشماق	*sun-ush-maq* (v. recip.) to stretch (limbs) towards one another, or together.
سووتماق	*suwu-'t-maq* (v. caus.) to cause to be or become cold, to cool (tr.).
سووشماق	*suwu-'sh-maq* (v. recip.) to become cold together, to cool (intr.) together.
سووق	*suwu'q* (vl. adj.) cold, cool.
سووماق	*suwu-maq* (v. intr.) to become cold, to cool.
سویاتماك	*süya-'t-mak* (v. caus.) to cause to support or prop up.
سویاغ	*su-yagh* (subs.) oil [literally 'water-fat'].
سویاق	*su-yaq*

سویاك	*süyak* (subs.) a bone, Kaz.
سویال	*süyal* (subs.) a wart, Kaz.
	süya-'l-mak (v. pass.) to be supported or propped (as a sick man).
سویام	*süyam* (subs.) a measure (the span between the forefinger and thumb).
سویاماك	*süya-mak* (v. tr.) to support or prop up (as a sick man); also, to prop up, or cause to lean, any object against some firmer thing; also metaphorically, to support the credit of any one.
سویاملاماك	*süyam-la-mak* (v. tr.) to span or measure with the thumb and forefinger.
سویانماك	*süya-'n-mak* (v. refl.) to support one's self by, to lean against.
سویانشماك	*süya-'n-ish-mak* (v. refl. recip.) to lean against one another.
سویکاماك	*süika-mak* (v. tr.) to smear, to daub.
سویکانشماك	*süika-'n-ish-mak* (v. refl. recip.) to rub or brush against one another (as men in a crowded street).
سویکانماك	*süika-'n-mak* (v. refl.) to smear one's self; also, to rub one's self (as an animal against a post).
سویماق	*sôi-mâq* (v. tr.) to kill by cutting the throat; also to skin.
سویماك	*süi-mak* (v. tr.) to love, to like; to kiss, to caress.
سویوکلوك	*süy-ük-lük* (vl. adj.) beloved.
سویونچي	*süy-ün-chi* (subs.) a reward for pleasure given, a (substantial) mark of gratitude.
سویونماك	*süy-ün-mak* (v. refl.) to be pleased or happy (literally, to like one's self, 'to fancy one's self').
سویونوچ	*süy-ün-üch* (subs.) pleasure, happiness.
سیپاتماق	*sîpa-'t-maq* (v. caus.) to cause to stroke.
سیپاشماق	*sîpa-'sh-maq* (v. recip.) to stroke one another.
سیپاماق	*sîpa-maq* (v. tr.) to stroke.
سیپالاماق	*sîpa-la-maq* (v. tr.) to stroke continuously; also specially, to feel about for any thing, to search with the fingers or hand, "*tâtonner.*"

سیپانماق *sîpa-'n-mâq* (v. refl.) to stroke one's self, to plume itself (of a bird), to arrange one's hair, &c.

سیپیچ *sipach* (subs.) a turban of white cloth.

سیپماك *sip-mak* (v. tr.) to strew, to sprinkle, to scatter [by dropping, not by casting].

سیتار *sitár* (subs.) a guitar [*seh* "three", *tár* "string"], P.

سیتارچی *sitâr-chi* (subs.) a player on the guitar, P. T.

سیخ *sikh* (subs.) a spit, a skewer, P.

سیر *sirr* (subs.) the colour vermilion; cinnabar, also colour in general.

سیر *Sirr* (prop. name) the River Jaxartes or Saïhun.

سیرپیلماك *serpi-'l-mak* (v. pass.) to be moved forward in a wave.

سیرپیماك *serpi-mak* (v. tr.) to move (a fluid or semi-fluid) forward in a wave.

سیرپینماك *serpi-'n-mak* (v. refl.) to move (itself) forward in a wave, to surge.

سیرقوراتماق *serqura-'t-maq* (v. caus.) to cause sharp pain in any particular spot of the body.

سیرقوراماق *serqura-maq* (v. intr.) to feel sharp local pain.

سیرلاتماق *sirr-la-'t-maq* (v. caus.) to cause to paint.

سیرلاشماق *sirr-la-'sh-maq* (v. recip.) to paint together.

سیرلاماق *sirr-la-maq* (v. tr.) to paint, to lay on colour.

سیرلیق *sirr-liq* (adj.) painted, coloured.

سیرماق *siyir-maq* (v. tr.) to tell one's beads (of a rosary).

سیریتماق *siri-'t-maq* (v. caus.) to cause to quilt.

سیریلماق *siri-'l-maq* (v. pass.) to be quilted.

سیریماق *siri-maq* (v. tr.) to quilt, to ornament a garment, &c. by rows of stitches.

سیز *siz* (pron.) you, [used respectfully to a single person as in English].

سیز *siz* (post-pos.) without, deprived of; also, as a privative affix to adjectives, &c., [*e. g.*, *khush-siz* "*un*-happy" or "*dis*-pleased"].

سیزدورماك	*sez-dur-mak* (v. caus.) to cause (involuntarily), to discover or become aware, to let out (a secret).
سیزغورماق	*sizghur-maq* (v. intr.) to whistle.
سیزلاق	*sizlaq* (adj.) unwell, ailing; *aghriq-sizlaq* (subs.) an epidemic.
سیزلاتماق	*siz-la-'t-maq* (v. caus.) to cause local pain.
سیزلاشماق	*siz-la-'sh-maq* (v. recip.) to feel pain together.
سیزلاماق	*siz-la-maq* (v. intr.) to feel any local pain.
سیزماق	*siz-maq* (v. tr.) to make a mark by scratching.
سیزماك	*sez-mak* (v. tr.) to detect, to become aware.
سیزیق	*siz-iq* (vl. subs.) a scratch, a line or mark scratched.
سیزیک	*sez-ik* (vl. subs.) a clue, a solution.
سیزیلماك	*sez-il-mak* (v. pass.) to be detected.
سیفونگ	*saïfung* (subs.) a tailor, Ch.
سیل	*sil* (subs.) a flood, a flooding, A.
سیلاتماق	*sila-'t-maq* (v. caus.) to cause to rub down, to cause to use friction.
سیلاتماق	*sîla-'t-maq* (v. caus.) to cause to entertain (a guest), Kaz.
سیلاشماق	*sila-'sh-maq* (v. recip.) to rub down together.
سیلاشماق	*sîla-'sh-maq* (v. recip.) to entertain one another, Kaz.
سیلاماق	*sila-maq* (v. tr.) to rub down, to use friction.
سیلاماق	*sîla-mâq* (v. tr.) to entertain (a guest) to show hospitality.
سیم	*sim* (subs.) wire, P.
سیماب	*sîm-ab* (subs.) quicksilver [literally "silver-water"], A. P.
سیمارماق	*simar-maq* (v. tr.) to tuck up one's sleeves or trousers.
سیمالاماق	*sima-la-maq* (v. tr.). The same as *simarmaq*.
سیمرتماك	*semir-'t-mak* (v. caus.) to become fat, to fatten (tr.).
سیمرشماك	*semir-'sh-mak* (v. recip.) to become fat together.
سیمرماك	*semir-mak* (v. intr.) to become fat, to fatten.
سمز	*semiz* (adj.) fat.
سین	*sin* (subs.) a trial, an experiment.
سیناتماق	*sina-'t-maq* (v. caus.) to cause to try.
سیناشماق	*sina-'sh-maq* (v. recip.) to try together.

سيناق *sina-'q* (vl. adj.) tried, proved.

سيناماق *sina-maq* (v. tr.) to try, to make trial, to test, to prove.

سيندورماق *sin-dur-maq* (v. caus.) to cause to break (intr.), to break (tr.).

سينچي *sin-chi* (subs.) a trier, an assayer, an experimenter; specially, a judge of horse-flesh.

سينگدورماك *sing-dur-mak* (v. caus.) to cause to be absorbed, to absorb (tr.).

سينگگيرماک *singgir-mak* (v. tr.) to blow one's nose.

سينگل *singil* (subs.) a sister younger than one's self.

سينگماک *sing-mak* (v. intr.) to be absorbed, to dry up.

سينگورماک *sing-ur-mak* (v. caus.) to cause to dry up, to absorb.

سينماق *sin-maq* (v. intr.) to break, to become broken.

ش

شات *shâp* (subs.) a straight sword.

شاپا لاق *shapalaq* (subs.) the palm of the hand together with the inner side of the fingers; also, a slap (with the open hand).

شاتال *shatal* (subs.) a percentage of the winnings at any game, taken by the landlord or by the Government.

شاتر *shâtir* (subs.) a man who goes in advance to clear the way by calling out to the people.

شاترلاتماق *shâtir-la-'t-maq* (v. caus.) to cause to make a noise so as to scare away birds, &c.

شاترلاشماق *shâtir-la-'sh-maq* (v. recip.) to make a noise, &c. in company.

شاترلاغوچ *shâtir-la-ghuch* (subs.) a rattle for scaring away birds, &c.

شاترلاماق *shâtir-la-maq* (v. tr.) to make a noise so as to scare away birds, &c., to spring a rattle, P. T.

شاتو *shâtu* } (subs.) a ladder.
شاتي *shâti* }

شاتير *shâtir.* The same as شاتر

شاخ *shâkh* (subs.) a branch, a twig; also a horn, antler, P.

شاخار	*shâkhâr* (subs.) potash, P.
شاخلاماق	*shakh-la-maq* (v. intr.) to branch out.
شادليق	*shâd-liq* (subs.) happiness, pleasure, P. T.
شاراق شاراق	*shârâq-shârâq* (subs.) the rattle or noise of a child's plaything, of a waggon, &c.
شاراقلاتماق	*sharaq-la-'t-maq* (v. caus.) to cause to rattle, to rattle (tr.).
شاراقلاماق	*sharaq-la-maq* (v. intr.) to rattle, to make a rattling noise.
شارقوراماق	*shâr-qura-maq* (v. intr.) to make a splashing noise, as a torrent or a waterfall.
شاشتورماق	*shâsh-tur-maq* (v. caus.) to cause to hurry.
شاشماق	*shâsh-maq* (v. intr.) to hurry, to make haste.
شاشورماق	*shâsh-ur-maq*. The same as *shashturmaq*.
شاغال	*shaghal* (subs.) a jackal.
شاف	*shâf* (subs.) a straight sword.
شافلاتماق	*shâf-la-'t-mâq* (v. caus.) to cause to strike with the sword.
شافلاشماق	*shâf-la-'sh-mâq* (v. recip.) to strike one another or together with the sword.
شافلاماق	*shâf-la-mâq* (v. tr.) to strike with the sword.
شاكال	*shakal* (subs.) broken walnut or other fruit-shells.
شال	*shâl* (subs.) a wooden plank. Also P. stuff made of goat's down, shawl.
شالياغليق	*shâl-yaghliq* (subs.) a woollen (shawl-stuff) handkerchief or small scarf.
شالاقلاتماق	*shalaq-la-'t-mâq* (v. caus.) to cause to jog, to cause to be shaken uncomfortably.
شالاقلاماق	*shalâq-la-mâq* (v. intr.) to jog, to be shaken uncomfortably.
شاللاقي	*shallaqi* (adj. and subs.) impudent, shameless (of a woman); also, a shameless woman.
شالتاق	*shaltaq* (adj.) defiled.
شالي	*shâli* (subs.) rice in the husk, P.
شام	*sham* (subs.) a candle [made in Eastern Turkistân of tallow with a wick of cotton wound round a central piece of reed], A.

شاما	*shâma* (subs.) refuse tea leaves after infusion.
شامال	*shamâl* (subs.) wind, (? A.).
شامه	*shamah* (subs.) a candle.
شانگ	*shang* (subs.) a present, [? CH.].
شانگغي	*shangghi* } (adj. and subs.) truculent, turbulent (of men), vicious (of animals).
شانگغو	*shangghu* }
شاوقوم	*shâuqum* (subs.) tumult, noise.
شاولانماق	*shâu-la-'t-maq* (v. caus.) to cause to murmur (as water).
شاولاماق	*shâu-la-maq* (v. intr.) to murmur (as distant waters), to hum (as a kettle).
شاوني	*shâuni* (subs.) a thread of hemp, flax or hair.
شاي	*shaï* (adj.) dandy, well-dressed.
شاي	*shâi* (subs.) a kind of silk stuff with large brilliant pattern, made in Central Asia [properly *shahi*, P.].
شايلاتماك	*shâi-la-'t-mak* (v. caus.) to cause to prepare.
شايلاماك	*shâi-la-mak* (v. tr.) to prepare, to make ready.
شايلانماک	*shâi-la-'n-mak* (v. refl.) to prepare one's self.
شُبشُب	*shüb-shüb* (subs.) the shuffling noise of slippers.
شبرلاشماق	*shibar-la-'sh-maq* (v. recip.) to whisper together.
شبرلاماق	*shibar-la-maq* (v. tr.) to whisper.
شبو	*shu-bû* (pron.) this very, this same.
شپيللاتماق	*shipil-la-'t-maq* (v. caus.) to cause to whistle (a whip).
شپيللماق	*shipil-la-maq* (v. intr.) to whistle through the air (as a whip or stick quickly moved), to whizz.
شخ	*shakh* (subs.) a precipitous cliff. Also (adj.), hard, difficult, P.
شخار	*shakhâr* (subs.) potash, P.
شده	*shadah* (subs.) a string of beads, &c.
شرم ليک	*sharm-lik* (adj.) shameful, also shame-faced, P. T.
ششاک	*shishak* (adj. and subs.) in the second year [sheep or goats].
ششمتوراك	*shish-tur-mak* (v. caus.) to cause to swell.
ششماک	*shish-mak* (v. intr.) to swell.

ششي *shashi* (subs.) a flimsy material used for linings.

شغاول *Shaghâwal* (subs.) a high official of Central Asian sovereigns, who is supreme over all the Kazis and Mullahs.

شفاتاپماق *shifâ-tap-maq* (comp. v. intr.) to recover (from illness), [literally "to find a cure"], A. T.

شفاكورماك *shifa-kurmak* (comp. v. intr.) to recover by the use of a remedy (from illness), to obtain benefit (from a remedy), [literally "to see or experience a cure"], A. T.

شكّاك *shak-kâk* (adj.) suspicious, jealous; also (subs.) a suspicious person, P. T.

شكل *shakl* (subs.) appearance, form, A.

شكل *shakal* (subs.) a walnut shell.

شمال *shamâl* (subs.) wind (from any quarter), [? A.].

شمه *shamah* (subs.) candle [for شمع, A.].

شو *shu* (pron.) that [said of things that are present, though not immediately under one's hand].

شوبو *shu-bu* (pron.) this or that very, the same.

شوتي *shuti* (subs.) a ladder.

شوخ *shokh* (adj.) playful, P.

شوخلا *shokhla* (subs.) a small yellow seed contained in a pod or fruit, [used in Turkistân as medicine, and in Tibet by the women to stick on to their faces]. The seed of ***Solanum nigrum*** according to Aitchison.

شوخلاماق *shokh-la-mâq* (v. tr.) to render playful, to make idle, to cause to play truant.

شوخلانماق *shokh-la-'n-mâq* (v. refl.) to be playful, to play [literally, to render one's self playful], to play truant.

شوخلانوشماق *shokh-la-'n-üsh-mâq* (v. refl. recip.) to play together or with one another.

شوخلوق *shokh-luq* (subs.) playfulness, idleness, distraction.

شودورونگ *shudurung* (subs.) dew.

شودرگار *shudugâr* (subs.) land ploughed previous to sowing, which is only done by very careful cultivators, (? P.).

شور *shor* (subs.) white efflorescence on the ground, common in certain districts and making the land barren, P.

شورا *shora* (subs.) saltpetre, P. Also, a small plant.

شورلاق *shor-laq*
شورليق *shor-liq* (subs. and adj.) covered with white efflorescence, salsugineous; also, land so affected, P. T.

شوشانگ *shoshang* (subs.) shears, (? Ch.).

شوق *shoq*. For *shokh*, P.

شوق *shoq* (subs.) an inclination or hobby, A.

شوک *shuk* (interj.) Silence! Be quiet!

شول *shul* (pron.) that [applied to less distant objects than *ul*, but not implying such nearness as *bul*].

شولا *shulla* (subs.) a dish composed of rice, meat and fat, cooked till it is soft.

شوم *shum* (adj.) unlucky, unfortunate, ne'er do weel, A.

شومچه *shum-chah* [for *shun-chah*] (adj. pron., also adv.) that much, to that amount or extent, [from *shul* 'that' and *chah*, for *chín* 'amount' or 'extent'].

شوملوق *shum-luq* (subs.) bad luck, coming to grief, [through fault or mismanagement), A. T.

شوندا *shun-dá* (adv.) there, in that (place), at that (place), [from *shul* 'that' and *dá* 'in' or 'at'].

شونداغ *shun-dagh*
شونداق *shun-daq* (adjl. pron., also adv.) that like, such; also, like that, so. [From *shul* 'that' and *diq* or *dagh* 'like'.]

شونغاچه *shun-gha-chah* (comp. adv.) that far, as far as to that, [from *shul* 'that', *gha* 'to' and *chah* for *chín* 'extent'].

شونقار *shunqár* (subs.) a kind of hawk, (?) '*Falco Hendersoni*.'

شونگاچه *shun-ga-chah*. The same as *shunghachah*.

شونونگغاچه *shu-nung-gha-chah*. The same, Y.

شونگقار *shungqár*. The same as *shunqár*.

شیخ *shaikh* (subs.) the chief person in charge of a mosque. *Shaikh-ul-Islam*, a sort of religious police-officer, looking after religious observances as well as bazár morals.

شیره *shirah* (subs.) grape-juice (sherbet); also rice-water, P.

شيريش *shirish* (subs.) a powder made from a certain root, and used mixed with water for glue.

سيكل *shikl.* For *shakl.*

شيلان *shilan* (subs.) cooked rations issued to soldiers, P.

شيلانچي *shilan-chi* (subs.) the officer charged with issuing these rations, P. T.

شيلتاق *shiltaq* (subs.) a frivolous complaint of assault, made for the purpose of extracting money.

شيلتاقچي *shiltaq-chi* (subs.) a person given to making such complaints.

شيليم *shilim* (subs.) paste made of flour or rice.

شيم *shim* (subs.) wide outer trousers, often large enough to take in the skirts of several robes.

شيمالاماق *shim-âl-a-mâq* (v. tr.) to tuck up quickly (sleeves or trousers,) [? from *shim* and *âlmâq* 'to take'] (governs the accusative both of the limb and also of the garment).

شيمالانماق *shim-âl-a'n-mâq* (v. refl.) to tuck up one's sleeves or trousers.

ض

ضعيفه *za'ifah* (subs.) a woman. [A.]

ضلل *zalal* (subs.) injury, [for *zarar*, A.].

ط

طاباق *ṭâbâq* (subs.) a dish, (of earthenware, wood or metal), A.

طاماق *ṭamâq* (subs.) the throat ; also Kh., any eatable.

طاناب *ṭanâb* (subs.) a measure used in measuring land, *viz.*, a square whose side is forty *gaz* in length, each *gaz* being about 3 feet 6 inches. Also, the tax levied on gardens and pleasure-grounds, which is assessed per *ṭanâb*, A.

طاي *ṭâï* (subs.) a young horse rising two years old.

طاياغ *ṭayagh* }
طاياق *ṭayaq* } (subs.) a walking-stick, or pole.

طلا *ṭillah* (subs.) gold ; also, a gold coin worth 10 shillings, P.

طوي *ṭoï* (subs.) a feast given on the occasion of a wedding or circumcision.

طویاغ *ṭüyâgh* } (subs.) an animal's hoof.
طویاق *ṭüyâq* }

طویدورماق *ṭoï-dur-maq* (v. caus.) to cause to be satiated, to satiate.

طویماق *ṭoï-maq* (v. intr.) to become satiated, to feast.

طوینماق *ṭoy-in-maq* (v. refl.) to satiate one's appetite, to gorge one's self.

طیار *ṭayyar* (adj.) ready, fit; also, fat, A.

غ

غاجاماق *ghâja-maq* (v. tr.) to gnaw.

غار *ghâr* (subs.) a cave, a cavern, A.

غارقوراتماق *ghâr-qura-'t-maq* (v. caus.) to cause to give a hollow sound.

غارقوراماق *ghâr-qura-maq* (v. intr.) to give a hollow sound.

غانجورغه *ghanjurghah* (subs.) a strap for fastening loads, &c., to the back of the saddle.

غاوغه *ghâoghah* (subs.) a row, a disturbance, P.

غرّ *gharr* (subs.) a woman of bad repute.

غُرّ *ghürr* (interj.) a term of mockery, used to a person who fails to accomplish what he has tried to do.

غُرونگلاشماق *ghurung-la-'sh-maq* (v. recip.) to speak together in such a way that the by-standers do not understand.

غُرونگلاماق *ghurung-la-maq* (v. intr.) to tinkle (as a camel's bell); also, to talk gibberish, to give an uncertain answer.

غلبر *ghalbir* (subs.) a coarse sieve.

غلتک *ghaltak* (subs.) a wooden disk (used as a wheel for play carts in Turkistân, and for working ones in many parts of India); also, a roller, a pulley, a reel, [? P. from *ghaltidan*].

غلچه *Ghalchah* (subs.) the name applied to the Aryan (Iranian) inhabitants of the mountain-districts chiefly Shîyar (Kolab, Mâcha, Karategin, Badakhshân, Wakhân, &c.); also, in Eastern Turkistân applied generally to a slave bought with money.

غنگغولّاماق *ghangghul-la-maq* (v. intr.) to hum (as a swarm of bees); to talk indistinctly (as a child), to babble.

غو *ghu*. An affix corresponding with our "n't" in "isn't there?" "doesn't it?" *E. g. bâr-ghu* "(there is) isn't there?"

غوجه *ghojah*. For *khojah*.

غوزه *ghoza* (subs.) a cotton-pod. For غوزۀ P.

غولجه *gholjah* (adj.) mad (of a dog).

غه *ghah* (post-pos.) to, on to, into, &c. (Also written *ga*, *qa* and *ka*), [used to imply action as distinguished from rest; *e. g.*, *kitab ga pit-tim* "I wrote in(to) the book;" but *kitab da tâptim* "I found in the book"].

غي *ghi*. See *ki* and *gi*.

غيجاق *ghijàq* (subs.) a violin.

ف

فات *fât* (adv.) quickly. The same as *pât*.

فافي *fâfi* (subs.) a dwarf with a full-sized trunk and head. The same as *pâpi*.

فوت *fut* (subs.) a leg (including the foot). The same as *put*.

فوچاك *fuchak* (adj.) empty, rotten at the core, of fair appearance but valueless. Also *puchak*.

فيخورماق *fikhür-mâq* } (v. intr.) to snort (of a horse).
فيشقرماق *fishqir-mâk* }

ق

قاب *qâb* (subs.) a coarse woollen sack.

قابات *qabat* (subs.) fold, covering, lap, stratum. *E. g.* يكي قابات كاغذده يورگانگ *iki kabat kâghaz dah yurga'ng* "wrap (it) in two folds of paper."

قاباتلاماق *qabat-la-maq* (v. tr.) to lay in layers, or one on the top of the other.

قاباق	*qabaq* (subs.) a gourd used for carrying water.
قاپاق	*qapaq*
قابرغه	*qabirghah* (subs.) a rib.
قاپارچوق	*qapar-chuq* (subs.) a rash on the skin.
قاپارماق	*qapar-maq* (v. intr.) to rise in a blister (as from a burn on the skin, or a rub on the foot from an ill-fitting boot).
قابالماق	*qaba-'l-mâq* (v. pass.) to be shut in.
قاباماق	*qaba-mâq* (v. tr.) to shut in, to confine (used of men only).
قاباماق	*qaba-maq* (v. intr.) to bark (of dogs).
قابان	*qaban* (subs.) a male pig, a boar.
قاپتال	*qaptal* (subs.) the two side pieces of a Turki saddle, from which the arch of the seat springs on both sides; also, that part of the horse's back covered by them, Kaz.
قاپتورماق	*qap-tur-maq* (v. caus.) to cause (a dog) to bite, to set on (a dog). [From *qap-maq*.]
قاپچه	*qap-chah* (subs.) a small sack *(qab)*.
قاپچوق	*qap-chuq* (subs.) a small *qab*, Kaz.
قاپشاشماق	*qapsa-'sh-maq* (v. recip.) to wrangle together, Kaz.
قاپساماق	*qapsa-maq* (v. intr.) to jangle, to wrangle, Kaz.
قاپقاق	*qapqaq* (subs.) a lid, a cover.
قاپقان	*qapqan* (subs.) a gin for catching foxes.
قپقرا	*qap-qara* (adj.) very black; [an intensive form of *kara*].
قاپقون	*qapqun*. The same as *qapqan*.
قاپلاتماق	*qap-la-'t-maq* (v. caus.) to cause to plate.
قاپلاماق	*qap-la-maq* (v. tr.) to plate (one metal with another).
قاپماق	*qap-maq* (v. tr.) to bite [used of dogs].
قات	*qat* (subs.) a fold, a stratum. [The same as *qabat*.]
قاڈار	*qatar* (subs.) a line, a row, P.
قاتاغان	*Qataghan* (prop. name) a tribe of Uzbek Tûrks inhabiting the districts of Kunduz, &c. [A Tajik proverb says: هرجا که رسید سُمِ اسپِ قاڈاغان - نه مُرده کفن یابد و نه زنده وطن "Where the hoof of the *Kataghan's* horse arrives, "There the dead find no grave-cloth, and the living no home".]

قاتقاق *qat-qaq* (adj.) stiffening, stiffened (as badly prepared leather); [from *qat-maq*].

قاتلاتماق *qat-la-'t-maq* (v. caus.) to cause to fold.

قاتلاماق *qat-la-maq* (v. tr.) to fold.

قاتلانماق *qat-la-'n-maq* (v. pass. and refl.) to be folded; to fold [itself.

قاتماق *qat-maq* (v. intr.) to become hard, to harden, to stiffen.

قاتماق *qat-maq* (v. tr.) to twist (yarn into thread); also, to join, to put together.

قاتناتماق *qatin-a-'t-maq* (v. caus.) to cause to travel (the same road) repeatedly.

قاتناماق *qatin-a-maq* (v. tr.) to travel (the same road) repeatedly; [to iterate, un-metaphorically].

قاتورماق *qat-ur-maq* (v. caus.) to cause to become hard, to harden (tr.). [From *qat-maq* "to become hard".]

قاتتورماق *qat-tur-maq* (v. caus.) to cause to twist (yarn) [From *qat-maq* "to twist".]

قاتیغ *qâtigh* }
قاتیق *qâtiq* } (subs.) curds.

قاتّیغ *qatt-igh* } (adj. and adv.) hard, stiff; severe; also, hardly, &c.
قاتّیق *qatt-iq* } [From *qat-maq*.]

قاتیم *qatim* (subs.) a time. *Bir qatim* once; *iki qatim* twice, &c.

قاتیم *qatim* (subs.) a needle-ful (of thread).

قاچا *qacha* (subs.) a vessel (of any sort), a pot, &c.

قاچان *qa-chan* (adv.) when? [Derived probably from the common element *qaï* "what," and some other word to denote measurement of time? *chîn* "amount".]

قاچانغاچه *qachan-gha-chah* (adv.) until when? [With the dative affix *gha* and the affix *chah* implying 'extent'.]

قاچقاچ *qâch-qâch* (subs.) flight (before the enemy). [From *qach-maq*.]

قاچقاق *qâch-qâq* (adj.) given to running away.

قاچقونچی *qâch-qu-'nchi* (subs.) a fugitive. [For *qach-qu-chi*.]

قاچماق *qâch-mâq* (v. intr.) to flee, to run away.

قاچورماق	*qâch-ur-mâq* (v. caus.) to cause to flee, to put to flight.
قاچوشماق	*qâch-ush-mâq* (v. recip.) to flee away together.
قاچي	*qâchi* (subs.) scissors, shears. [For *qainchi.*]
قاچير	*qachir* (subs.) a mule. [For *khachar*, P.]
قار	*qâr* (subs.) snow.
قارا	*qarâ* (adj.) black. *Qara-tàgh* often used to designate mountains which are not covered with perpetual snow. (See Remarks, under *Aq-tàgh.*) *Qara-su* is similarly used to designate springs of water not derived from snow mountains. (The same remarks apply here.)
قاراتماق	*qarâ-'t-maq* (v. caus.) to cause to look, to cause to regard.
قاراغاي	*qara-ghaï* (subs.) a fir-tree [generically].
قاراقچي	*qarâqchi* (subs.) a highway robber, a bandit.
قارالاماق	*qarâ-la-maq* (v. tr.) to look frequently or carefully.
قارالاماق	*qarâ-la-maq* (v. tr.) to blacken (the face of any one, metaphorically), to look black upon, to regard with disfavour.
قارالماق	*qarâ-'l-mâq* (v. pass. and intr.) to be blackened; to become black.
قاراليق	*qara-liq* (adj.) in mourning (which in Yarkand consists in not shaving, putting on white and not-coloured clothes, &c.)
قاراماق	*qara-mâq* (v. intr.) to look, to cast one's eyes [governs *gha*].
قارامتول	*qara-'mtul* (adj.) blackish.
قاراموق	*qara-muq* (subs.) a small black seed of a weed found among [wheat.
قارانغو	*qara-'nghu* (adj. and subs.) dark, obscure; also, the dark.
قارانغولوق	*qara-'nghu-luq* (subs.) darkness, obscurity.
قاراول	*qarâ-wal* (subs.) a post of observation, a watch, [from *qaramaq*].
قاراولچي	*qarâ-wal-chi* (subs.) a watchman, a vidette.
قارتا	*qarta* (subs.) the fat in a horse's stomach. Also, playing cards, Rus.
قارتانگ	*qar-'tang* (adj.) oldish, past the middle age.
قارچيغه	*qarchighah* (subs.) a species of a hawk, ? a gos hawk.

قارچي	*qarchi* (subs.) large scissors [for *qainchi*].
قارساق	*qarsaq* (subs.) a small kind of fox.
قارشماق	*qâr'sh-maq* (v. intr.) to be disobedient, to be recusant [? for *qâra'sh-maq* "to exchange looks with any one"].
قارشماق	*qarsh-maq* (v. tr.) to mingle, to mix up.
قارشي	*qâr'shi* (adv.) contrary, opposite. [? From *qara-maq*, *qarâ-'sh-maq*.]
قارشيلاتماق	*qâr'shi-la-'t-maq* (v. caus.) to cause to make an angry rejoinder; to cause to place opposite.
قارشيلاشماق	*qar'shi-la-'sh-maq* (v. recip.) to make rejoinders to one another.
قارشيلاماق	*qâr'shi-la-maq* (v. tr.) to place opposite.
قارغاتماق	*qargha-'t-maq* (v. caus.) to cause to curse.
قارغاشماق	*qargha-'sh-maq* (v. recip.) to curse together.
قارغاماق	*qargha-maq* (v. tr.) to curse.
قارغانماق	*qargha-'n-maq* (v. refl.) to curse one's self, *viz.*, to imprecate curses on one's self in asseverating anything.
قارغو	*qarghu* (subs.) a blind man.
قارغيش	*qarghish* (vl. subs.) a curse.
قارغه	*qarghah* (subs.) a crow.
قارقرا	*qarqara* (subs.) a tuft or crest stuck in a woman's cap.
قارلوغاچ	*qarlughach* (subs.) a swallow.
قارليق	*qâr-liq* (adj.) snowy. Also the name of a Pass in the Kuen-lun leading from Yolarik to Toghra-su on the Upper Karakash.
قارماق	*qarmaq* (subs.) a fish hook.
قارمالاتماق	*qarma-la-'t-maq* (v. caus.) to cause to grope.
قارمالاماق	*qarma-la-maq* (v. tr.) to grope (for anything in the dark).
قارماماق	*qarma-maq* (v. tr.) to seize, KIRGH.
قارون	*qârun* (subs.) belly, womb.
قارونداش	*qârun-dash* (subs.) a brother, a relation, [literally 'womb-fellow']. The particular relation is specified by the words: *bir-tuqqan qârundash* = one generation relation

or first (degree) of relationship, *viz.*, brother or sister; *iki-tuqqan qârundash* = related in second degree, &c., *viz.*, children of brothers or sisters, &c.; *ughul qârundash* "a male relative;" *qiz qârundash* "a female relative."

قاري *qâri* (subs.) a person who can repeat the Koran by heart, A.

قاري *qari* (adj. and subs.) old, aged (used only of living creatures); also, an old man, an old woman.

قاريش *qârish* (subs.) a span.

قاريشلاتماق *qârish-la-'t-maq* (v. caus.) to cause to span.

قاريشلاماق *qârish-la-maq* (v. tr.) to span out, to measure by spans.

قاريلماق *qâr-il-maq*. For *qairilmaq*.

قاريليق *qari-liq* (subs.) old age.

قاريماق *qari-maq* (v. intr.) to become old.

قاز *qâz* (subs.) a goose [for *ghâz*, P.].

قازا *qâzâ* (subs.) fate, predestination [for قضا A.].

قازاق *Qàzàq* (prop. name) the name of several vast hordes of nomads known to the Russians as the Great, Middle and Little Hordes of *Kírghiz* (see that name). The *Qàzàqs* are divided (according to Turki reckoning) into three hordes: 1st, *Ulugh-yüz* (great horde) sub-divided into the tribes *Abdan* and *Dolat*; 2nd, *Urta-yüz* (middle horde) sub-divided into the tribes, *Arghun*, *Naïman*, *Qipchaq*, *Kungrat*; 3rd, *Kichik-yüz* (little horde) *Alchin*, *Jabbas*. There are also innumerable further sub-divisions of each of these tribes.

قازان *qâzan* (subs.) a cauldron, a cooking-pot.

قازماق *qâz-maq* (v. tr.) to dig.

قازناق *qâznaq* (subs.) an inner room or store room, [? from *khazànah*, A.].

قازوق *qazuq* (subs.) a peg.

قازي *qazi* (subs.) a sausage of horse-flesh.

قازيق *qaziq*. The same as *qazuq*.

قازيليق *qazi-liq*. For *qazi*, Kaz.

قازیماق *qâzi-mâq*. The same as *qâzmâq*.

قاسقان *qasqan* (subs.) a thin broad wooden hoop forming the edge of a sieve, or of certain trays with perforated bottoms which are placed one above another over a cauldron of boiling water for the purpose of cooking pastry by steam.

قاسلاتماق *qas-la-'t-maq* (v. caus.) to cause to resolve.

قاسلاشماق *qas-la-'sh-maq* (v. recip.) to resolve together, to conspire.

قاسلاماق *qas-la-maq* (v. tr.) to resolve, to determine, to intend. [From قصد A.]

قاسماق *qasmaq* (subs.) scrapings of a cooking-pot, *táz-qasmaq* the scurf of a scald head.

قاش *qâsh* (subs.) the hair of the eye-brows; also, metaphor. a man's neighbourhood or presence; *e. g.*, *aning qâsh-i-da* = near him, with him.

قاشانگ *qashang* (adj.) lazy, slow, sluggish.

قاشاو *qashao* (subs.) a curry-comb.

قاش تاش *qâsh-tash* (subs.) jade-stone. [This is found in the mountains of Khotan and Sanju, the so-called Kuen-lun. There are three varieties: 1st, *chaza-tash* obtained from the quarries, often full of flaws which destroy its value; 2nd, *pur-tash* (rotten stone) or *kawash* a soft variety of the same; 3rd, *su-tash* (water stone) the most esteemed; it is obtained in the form of pebbles, water-worn in the beds of the streams, whereby probably the flaws are eliminated, the resulting pebble being sound to the core, and therefore not likely to render useless the long labour of carving it, by the discovery of a hidden flaw in the centre. *Chapan-lik tash* (coated stone) a pure nucleus with a reddish outside is highly valued.]

قاشقا *qâshâq* (subs.) an animal's forehead.

قاشوق *qashuq* (subs.) a spoon for eating soup.

قاشیلاغوچ *qâshi-la-ghuch* (subs.) a curry-comb.

قاشیلاماق *qâshi-la-maq* (v. tr.) to scratch all over (with the hands).

قاشيماق	*qashi-maq* (v. tr.) to scratch (on account of itching).
قاشينماق	*qashi-'n-maq* (v. refl.) to scratch one's self.
قاق	*qaq* (adj.) dried, desiccated.
قاق	*qaq* (subs.) a temporary pool of water.
قاقتورماق	*qaq-tur-maq* (v. caus.) to cause to drive in (a nail, &c.).
قاقرماق	*qâqir-maq* (v. tr.) to cough up phlegm.
قاقريق	*qâqriq* (subs.) phlegm from the mouth.
قاقشاماق	*qâqsha-mâq* (v. intr.) to lament in a plaintive or querulous manner.
قاقليق	*qâq-liq* (subs.) dryness, desiccation.
قاقماق	*qâq-maq* (v. tr.) to drive in (a nail); also, to beat (a garment, &c., to remove the dust).
قاقيلماق	*qâq-il-mâq* (v. pass.) to be driven in.
قاقينماق	*qâq-in-mâq* (v. refl.) (lit. to beat one's self) to dust one's self (by quick strokes of the hand).
قالا	*qalá* (subs.) a fortress, a fort [for قلعه A.].
قالاتماق	*qâla-'t-mâq* (v. caus.) to cause to pile up.
قالاق	*qâlâq* (subs.) a small wooden spoon for feeding small children.
قالاماق	*qâla-mâq* (v. tr.) to pile up, to make up a fire.
قالايي	*qalâyi* (subs.) tin [for قلعي A.].
قالپاق	*qâlpâq* (subs.) a felt wide-awake (hat), worn in hot weather by travellers, &c.
قالتاق	*qâltâq* (adj.) unworthy of credit, untrustworthy.
قالتوراق	*qâltura'q* (vl. adj. and subs.) palsied, trembling; a person afflicted with the palsy.
قالتوراتماق	*qâltura-'t-mâq* (v. caus.) to cause to tremble.
قالتوراماق	*qâltura-mâq* (v. intr.) to tremble, to quake, to shiver.
قالديراق	*qaldiraq* (adj.) rustling (as paper or badly prepared leather, when crushed together).
قالديراتماق	*qâldira-'t-mâq* (v. caus.) to cause to rustle.
قالديراماق	*qâldira-maq* (v. intr.) to rustle, to give a rustling sound.
قالديرتماق	*qâl-dir-'t-mâq* (v. caus. redup.) to cause to put by.

قالدیرماق *qâl-dir-mâq* (v. caus.) to cause to remain, to put by, to leave. [From *qâl-mâq.*]

قالدیغاچ *qâldighach* (subs.) a swallow.

قالغیتماق *qalghi-'t-maq* (v. caus.) to cause to be drowsy, to make (any-one) sleepy (as by talking overmuch).

قالغیماق *qalghi-maq* (v. intr.) to become drowsy, to become sleepy, to nod.

قالماق *qâl-mâq* (v. intr.) to remain, to stay behind. In composition with the Perf. Part. of another verb it expresses completion or condition: *e. g., ketip qâldi* "he has started" (lit. "he remained gone"); *getip-qâladur* "he is starting" (lit. "he is in the condition of starting").

قالماق *Qâlmâq* (prop. name) a nomad people of Buddhist faith, living to the east of the Amír of Kashghar's dominions, the 'Calmucks' of European writers. The name appears to be applied to all the Mongolian tribes, by the Turks.

قالقیتماق *qalqi-'t-maq* (v. caus.) to cause to float.

قالقیماق *qalqi-maq* (v. intr.) to float. Also, to hover.

قالون *qalun* (subs.) a kind of open horizontal harpsichord, consisting of many strings of different lengths which can be tightened by turning their pegs or by means of moveable bridges. It is played partly with the fingers (like a harp) and partly with a little metal instrument like a tooth-pick. [For *qanun*, P.]

قالین *qâlin* (subs.) a carpet, a rug of carpeting, P.

قالینگ *qâling* (adj.) thick.

قاما *qama* (subs.) an otter, otter-skin.

قاماتماق *qama-'t-maq* (v. caus.) to cause to enclose or besiege.

قامالماق *qama-'l-maq* (v. pass.) 1, to be enclosed; 2, to have one's teeth set on edge.

قاماماق *qama-maq* (v. tr.) to enclose, to besiege.

قاماماق *qama-maq* (v. tr.) to set the teeth on edge (as anything acid).

قامچي	*qamchi* (subs.) a riding-whip (consisting of a short wooden handle with a thick stiff thong of plaited leather, lashed on so as to form one line with the handle).
قاملاشتورماق	*qam-la'sh-tur-máq* (v. recip. caus.) to put together, to cause to live at peace together, &c., *(raccommoder* in both senses).
قاملاشماق	*qam-la'sh-máq* (v. recip.) to be fitted together (as broken pieces of anything); to be in unison, to be at peace together; to assist. [? From an unusual *qam-la-maq*.]
قاملاشيشماق	*qam-la'sh-ish-maq* (v. recip. redup.) to assist one another.
قاميش	*qamish* (subs.) a reed.
قان	*qân* (subs.) blood. Also, bloodshed.
قانات	*qanât* (subs.) a wing. Also, the side-covering of a Kirghiz *âkuï* or felt-tent.
قاناتماق	*qân-a-'t-maq* (v. caus.) to cause to bleed.
قاناماق	*qân-a-maq* (v. intr.) to bleed.
قانتوكماب	*qân-tukmaq* (v. comp.) to shed blood, to massacre.
قانتيچتي	*kân-tichti* (verb used as an adj.) skin-flint, miserly. [Lit. 'he evacuates blood'.]
قانجورغه	*qanjurghah* (subs.) straps in the cantle of a saddle for fastening a cloak, &c.
قانجوغه	*qanjughah*. The same, KAZ.
قانجيغه	*qanjighah*. The same, KH.
قانچه	*qan-chah* (adv.) how much? how many?
قاندا	*qan-dà* (adv.) where?
قانداغ	*qan-dàgh* } (advl. pron. and adv.) what like? what kind of? Also, how?
قانداق	*qan-dàq* }
قاندررتماق	*qan-dur-'t-maq* (v. caus. redup.) to cause to satisfy the thirst (of another).
قاندورماق	*qan-dur-maq* (v. caus.) to cause (any man or animal) to satisfy (his or its) thirst.
قاندين	*qan-din* (adv.) from whence?
قانليق	*qân-liq* (adj.) spotted with blood.

قانماق *qan-maq* (v. intr.) to quench one's thirst; to satisfy one's desire for sleep [governs *su* or *uïqu* with *gha*].

قانگتارتماق *qangtar-'t-maq* (v. caus.) to cause to fasten a horse's head up short.

قانگتارماق *qangtar-maq* (v. tr.) to fasten a horse's head up short by a bearing-rein, or by hitching the reins over the peak of the saddle.

قانگشار *qangshâr* (subs.) the bone of the nose, the part midway between the bridge and the tip.

قانگشارليق *qangshâr-liq* (adj.) hook-nosed.

قانه *qanah* } (adv.) where? Also used as an exclamation equi-
قاني *qani* } valent to our 'well.'

قاو *qâo* (subs.) tinder (made of fungi or of the down of a kind of flowering reed), Kh.

قاورچاق *qâurchaq* (subs.) a doll, an image for children to play with. Also, the figures in a kind of Punch and Judy show, which are dressed up on a man's fingers, who hides behind a cloth and manipulates these marionettes, making speeches for them in a feigned or falsetto voice produced by holding a small tube in his month, Kh., (in Yarkand pronounce *qorchaq*).

قاورغه *qâurgha* (subs.) a rib.

قاورماچ *qâur-mach* (subs.) parched or roasted grain.

قاورماق *qâur-maq* (v. tr.) to roast (grain), to fry.

قاوغه *qâughah* (subs.) a leather pail for drawing water.

قاوغون *qâughun* (subs.) a melon.

قاي *qaï* (pron.) which, what [only used in composition as *qaï-da*, *qaï-si*].

قاياش *qayash* (subs.) [in composition with *tuq-qan* or *uruq*] relation, relative.

قايان *qâ'-yân* (adv.) which side? Used also with the affixes *da*, &c. As *qâ'-yân-da* "on which side;" *qa'-yan gha* "to which direction;" *qâ'-yân-i-da* "on which side of it."

قايتا *qaïta* (subs. and adj.) a fresh beginning; beginning afresh [*qaïtabâsh-din yessadim* "I made it over again (lit. 'from a fresh head') or *qaïta din yessadim* (lit. "I made it from a fresh beginning")].

قايتارتماق *qaït-ar-'t-maq* (v. caus. redup.) to cause to turn back (tr.). to order any one to be turned back.

قايتارماق *qaït-ar-maq* (v. caus.) to cause to return, to turn back (tr.).

قايتاقي *qaïtaqi* (subs.) the turned-back edge of any garment (as a European coat-collar).

قايتام *qaïtam* (adv.) on the contrary.

قايتماق *qaït-maq* (v. intr.) to return, to come or go back, Kh.

قايچي *qaïchi* (subs.) scissors, shears.

قايدا *qaï-da* (adv.) where?

قايداغ *qaï-dâgh* (adjl. pron. and adv.) what like? also, how?

قايداغراق *qaï-dâgh-râq* (adv.) how again? or how further? [lit. the comparative of 'how?' to which the reply would be 'better' or 'worse,' not simply 'well' or 'ill'].

قايداق *qaï-daq.* The same as *qaïdâgh.*

قايراتماق *qaïra-'t-maq* (v. caus.) to cause to whet or sharpen.

قايراق *qaïra'q* (vl. subs.) a whet-stone, a rough hone.

قايراماق *qaïra-maq* (v. tr.) to whet, to sharpen on a stone, "*repasser.*"

قايرتماق *qayir-'t-maq* (v. caus.) to cause to retrovert forcibly.

قايردان *qa'-yer-dan* (adv.) from what place? whence?

قايرليق *qa'-yer-liq* (adj.) belonging to what place? of what place?

قايرماق *qayir-maq* (v. tr.) to retrovert forcibly, to force back (the arm or any long-shaped object) into an unnatural position.

قايريلماق *qayir-il-maq* (v. pass.) to be retroverted.

قايرينماق *qayir-in-maq* (v. refl.) to retrovert itself.

قايسي *qaï-si* (pron.) which of them? who amongst them? [the *si* is the possessive affix of the 3rd person].

قايش *qâish* (subs.) strap-leather.

قایشتورماق *qâish-tur-maq* (v. caus.) to cause to be retroverted forcibly, to retrovert forcibly (same as *qayir-maq)* ; also, to cause to use continuous efforts.

قایشماق *qâish-maq* (v. intr.) to be retroverted forcibly ; also, to use continuous efforts.

قایغو *qaïghu* (subs.) sorrow, grief [? vl. subs. from an obsolete verb *qaï-maq*].

قایغورتماق *qaïghur-'t-maq* (v. caus.) to cause to be sorrowful.

قایغورماق *qaïghur-maq* (v. intr.) to be sorrowful, to grieve.

قایغولیق *qaïghu-liq* (adj.) sorrowful, grief-laden.

قایماق *qaïmaq* (subs.) cream [often prepared by warming the milk, as in the preparation of Devonshire cream].

قاین *qâïn* (subs.) the birch-tree (whose bark is in sheets like paper).

قاین *qâïn* (adj., used only in comp.). Answers to our phrase "—— in-law." E. g. *qâïn-ata* "father-in-law," *qâïn-ana* "mother-in-law."

قاینگ *qaïng* (subs.). For *qâïn* "a birch-tree."

قایناتماق *qaïna-'t-maq* (v. caus.) to cause to boil, to boil (tr.).

قایناماق *qaïna-maq* (v. intr.) to boil (as water).

قایورماق *qayur-maq*. For *qayir-maq* (which see).

قایوق *qayuq* (adj.) nasty, having a bad taste.

قایوماق *qâyu-maq* (v. intr.) to swim (said of one's head).

قایوماق *qâyu-maq* }
قاییماق *qâyi-maq* } (v. tr.) to stitch, to hem-stitch.

قبت *qabat*. The same as قابات.

قبارماق *qabar-maq*. Kh. }
قپارماق *qapar-maq* } The same as قاپارماق.

قباماق *qaba-maq*. The same as قاباماق.

قپ *qip* a particle used before *qizil* to signify "intensely," "very."

قپلان *qaplân* (subs.) an ounce (or white leopard).

قت *qat*. The same as قات.

قتيغ *qatigh*
قتيق *qatiq* } The same as فاتيع, قاتيق.

قتيم *qatim.* The same as قاتيم.

قچرماق *qichir-maq* (v. tr.) to call, to summon.

قچقرماق *qichqir-maq* (v. intr.) to shout.

قچي *qichi* (subs.) mustard.

قچيشقاق *qichish-qaq* (subs.) the itch.

قچيشماق *qichi'sh-maq* (v. recip.) to itch all over.

قچيماق *qichi-maq* (v. intr.) to itch (said of others).

قچينماق *qichi-'n-maq* (v. refl.) to itch (said of the person who speaks).

قدا *quda* (see) (فودا).

قر *qür* (prond. *qirr*) (subs.) a ridge, an edge formed by two planes meeting at an angle.

قرا *qará* (adj.) black.

قرالاماق *qarál-'maq.* The same as قارالاماق.

قرانغو *qará-'n-maq.* The same as قارانغو.

قردورماق *qür-dür-maq* (v. caus.) to cause to scrape, &c.

قرغوچي *qir-ghu-chi* (subs.) a turner, a person who works with a lathe. [From قرماق.]

قرغول *qirghol* (subs.) a pheasant (of a species resembling the European, but named ***Phasianus Shawii*** in Elliott's Book of Pheasants).

قرق *qirq* (num.) forty.

قرقايلان *qirq-aïlan* (num. subs.) a group of forty.

قرقنچي *qirq-inchi* (num. adj.) fortieth.

قرماق *qür-maq* (prond. *qirr-maq*) (v. tr.) to scrape, to scratch off, to scratch out; to turn (any article by means of a lathe, *quasi* "to scrape off the outer layers"); also, to destroy utterly, to "wipe out;" also, to spend (time).

قري *qarri* (subs.) an old woman.

قريلماق *qür-il-maq* (prond. *qirr-il-maq*) (v. pass.) to be scraped off; to be turned (in a lathe); to be utterly destroyed ("wiped out").

قز *qiz* (subs.) a maid, a virgin, a damsel ; also, a daughter. [? From a root signifying "redness" for "modesty." See *qizarmaq*.]

قزارتماق *qiz-ar-'t-maq* (v. caus.) to cause to redden, to make red.

قزارماق *qiz-ar-maq* (v. intr.) to redden, to become red, to blush. [? From the same root as above, see also *qiz-maq*.]

قزان *qazan*. The same as قازان.

قزاق *qazaq*. The same as قازاق.

قزماق *qiz-maq* (v. intr.) to become hot or warm ; also metaph., to become or to be eager [in Uighur it seems to mean "to redden" see Vambery], Kaz.

قزيتماق *qiz-it-maq* (v. caus.) to cause to be hot or eager.

قزيق *qiziq* (vl. subs.) warmth, eagerness, vivacity [from *qizimaq*].

قزيل *qizil* (adj.) red. [? A passive form (in *il*) from a root signifying 'heat' as well as 'redness,' which would thus be the common origin of *qiz-maq*, *qiz-ar-maq*, *qiz-il* and *qiz*.] (See also *yàshil*.)

قزيماق *qizi-maq* (v. intr.). The same as *qiz-maq*.

قزيندورماق *qiz-in-dur-maq* (v. refl. caus.) to cause to warm one's self.

قزينماق *qiz-in-maq* (v. refl.) to warm one's self.

قول *qul* (subs.) a slave.

قللوق *qul-luq* (subs.) slavery, service. Also used as a complimentary reply to congratulations, in the name of "your servant" or "my service to you."

قمتو *qamtu* (adv.) in company.

قميز *qimiz* (subs.) an intoxicating liquor made from mare's milk, Kaz.

قنات *qanât*. The same as قانات.

قوالاتماق *quala-'t-maq* (v. caus.) to cause to pursue ; to cause to drive away, Kaz.

قوالاماق *quala-maq* (v. tr.) to pursue ; to drive away, Kaz.

قوانجي *quanji* (subs.) happiness.

قوانماق *quan-maq* (v. intr.) to be happy, to be pleased.

قوبوز *qûbuz*
قوپوز *qupuz* (subs.) a Jew's harp. Also, a rough guitar with horse-hair strings. Also, the inside of the cheek.

قوبوزاق *qubuzâq*
قوبوق *qubuq* (subs.) the bark of trees.

قوپارتماق *qup-ar-'t-maq* (v. caus. redup.) to cause to arouse.

قوپارماق *qup-ar-maq* (v. caus.) to cause to stand up, to arouse.

قوپال *qopal* (adj.) rude, unpolished (used either of men or things).

قوپماق *qup-maq* (v. intr.) to rise up, to arise.

قوپوق *qupuq* (subs.) a term used in gambling with sheep's knuckle bones, implying success. As *maning qupuq-um kelde* "I have won the toss," *qupuq maning-ki* "the toss is mine (I have won it)."

قوت *qut* (subs.) blessing, happiness.

قوتاز *qotaz*
قوتاس *qotas* (subs.) a yak (*Bos grunniens*').

قوتان *qutan* (subs.) a sheep-fold; a place where a flock of sheep is collected to pass the night, Kaz.

قوتقارماق *qut-qâr-mâq* (v. caus.) to cause to be free, to release.
قوتقازماق *qut-qâz-mâq* [From an obs. *qut-maq*.]

قوتلوق *qut-laq* (adj.) blessed.

قوتور *qotur* (subs.) the itch.

قوتورماق *qutur-maq* (v. intr.) to go mad (of a dog), to be rabid.

قوتولدورماق *qut-ul-dur-maq* (v. caus.) to cause to become free, to release.

قوتولماق *qut-ul-maq* (v. pass.) to be made free, to be released. [From an obs. *qut-maq*.]

قوچاق *quchaq* (subs.) an armful, as much (of any thing) as can be embraced in the arms. [From *quch-maq*.]

قوچاقلاشماق *quchaq-la-'sh-maq* (v. recip.) to embrace one another.

قوچاقلاماق *quchaq-la-maq* (v. tr.) to embrace, to take in the arms.

قوچقاچ *quchqach* (subs.) a small bird (of any sort).

قوچقار *quchqâr* (subs.) a ram.

قوچماق *quch-mâq* (v. tr.) to embrace, to take in the arms.

قوچورماق *quch-ur-mâq*. The same as *qâchurmâq*.

قوچوشماق *quch-ush-maq* (v. recip.) to lie in one another's arms.

قودا *quda* (subs.) a person standing in the relationship of father-in-law to one's son or daughter; one of two fathers whose children have intermarried.

قودوق *quduq* (subs.) a well.

قوّر *qurr* (subs.) a garter, a tape for fastening up leggings.

قور *qûr* (subs.) a balance, a remainder (of goods or money).

قورا *qura* (subs.) a space enclosed by hurdles or railings; a fold, a pen.

قورام *qoram* (subs.) ground covered with large blocks of stone (fallen from the mountains). [? The origin of *qara-qoram*.]

قوراماق *qura-maq* (v. tr.) to make patch-work, to make a garment &c., by sewing together small patches of stuff.

قُوراماق *quwura-maq* (v. intr.) to dry up hard (as a skin exposed to the sun, &c.), KAZ.

قورباشي *qurbashi* (subs.) a chief police official, a 'Kotwal.'

قورت *qurt* (subs.) a worm, a grub.

قورتلاتماق *qurt-la-t-maq* (v. caus.) to cause or allow to breed worms (of meat &c.).

قورتلاماق *qurt-la-maq* (v. intr.) to breed worms (of meat &c.).

قورچاق *qurchaq*. The same as *qâurchaq*.

قورچي *qur-chi* (subs.) a superintendent of a magazine. [See *qurkhana* and *qur*.]

قورخانه *qur-khâna* (subs.) a magazine (for powder and balls).

قورداش *qur-dash* (subs.) a contemporary.

قوردوم *qurdum* (subs.) a place where any stream disappears (in the sand, &c.). [The Yarkand River is said to disappear in a district called *kurdum-kâk*.]

قورساق *qursaq* (subs.) stomach, belly.

قورساقداش *qursaq-dâsh* (subs.) a brother or sister by the same mother [lit. "womb-fellow"].

قورساقلاش *qursaq-lash.* The same.

قورشاتماق *qursha-'t-maq* (v. caus.) to cause to surround.

قورشاماق *qursha-maq* (v. tr.) to surround, to encircle.

قورغاشون *qurghashun* (subs.) lead.

قورغان *qurghân* (subs.) a fort, a fortress.

قورغانچه *qurghan-chah* (subs.) a small fort, a redoubt.

قورقماق *qurq-maq* (v. intr.) to fear, to be afraid.

قورقوتماق *qurq-ut-maq* (v. caus.) to cause to fear, to frighten.

قورقونجليق *qurqu-'nj-liq* (adj.) fearful, causing fear, frightful.

قورقونچاق *qurq'u-'nchak* (adj.) fearful, afraid, cowardly.

قورقونچي *qurqu-'nchi* (vl. subs.) fear, fearing.

قورماق *qûwur-maq* (v. tr.) to fledge.

قوروت *qurut* (subs.) dried curds.

قوروتماق *quru-'t-maq* (v. caus.) to cause to dry.

قوروچ *quruch* (subs.) steel.

قوروغ *qurugh* } (vl. adj.) dried, dry.
قوروق *quruq* }

قوروق *qûruq* (vl. subs.) a field of growing grass, fenced round to prevent its being grazed on. [From *qûru-maq.*]

قوروقماق *quruq-maq.* The same as *qurq-maq.*

قوروم *qurum* (subs.) soot, the black deposit of smoke.

قورومساق *qurum-saq* (subs. and adj.) a miser; miserly, stingy. [? From *quru-maq* "to dry up" in the same way as *bolum-saq* "likely to become (useful)," modern phrase "a likely boy," from *bol-maq* "to become," &c.]

قوروماق *quru-maq* (v. intr.) to become dry, to dry up.

قوروماق *qûru-maq* (v. tr.) to scare away birds and beasts from a field.

قورون *qürün.* The same as *kurum*, Y.

قورونماق *quru-'n-maq* (v. refl.) to dry one's self.

قورونماق *quru-'n-maq* (v. refl.) to guard one's self, to protect one's self (from the mud on a road, from flies or mosquitoes, &c.).

قوز *qôz* (subs.) hot embers or cinders.

قوزغاتماق *quzgha-'t-maq* (v. caus.) to cause to move; (tr.) to cause to shift.

قوزغالماق *quzgha-'l-maq* (v. pass.) to be moved, to be shifted.

قوزغاماق *quzgha-maq* (v. tr.) to move, to shift.

قوزغانماق *quzgha-'n-maq* (v. refl.) to move one's self, to shift one's self.

قوزغون *quzghun* (subs.) a raven (supposed by the Turkis to live a thousand years).

قوزوق *quzuq* (subs.) a peg.

قوزي *qozi* (subs.) a lamb.

قوش *qush* (subs.) a bird.

قوش *qosh* (subs.) a pair; also, a household, a set of people using one fire, [chiefly used however in the sense of people on a journey: *e. g.*, *bu kârwan nichah qosh* "how many tents or fire (does) this caravan (consist of)"]. Also, quarters, lodgings.

قوُش *quwush* (adj.) hollow.

قوشباشي *qosh-bashi* (subs.) the headman or responsible head of each set of merchants, &c., composing a caravan.

قوشبيگي *qosh-bégi* (subs.) the title of a high official 'Lord of the Household,' who acts for the king in his absence.

قوشتورماق *qosh-tur-maq* (v. caus.) to cause to join; (tr.) to cause to unite.

قوشقون *qoshqun* (subs.) a crupper.

قوشماق *qosh-maq* (v. tr.) to join, to unite, to put together.

قوشماق *qoshmaq* (adj.) united, joining (used only of the humps of a two-humped camel when they almost coalesce).

قوشنا *qosh-na* (subs.) a neighbour; also, a person allowed to live in some part of one's house.

قوشناچ *qushnâch* (subs.) a soothsayer, or foreteller of future events.

قوشنانجي *qushnanji* (subs.) an educated woman; also, a female teacher.

قوشني *qosh-ni*. The same as *qoshna*.

قوشورماق	*qosh-ur-maq.* The same as *qoshturmaq.*
قوشوق	*qoshuq* (subs.) a ladle.
قوشوق	*qosh-uq* (vl. subs.) poetry, verse, a poem, a song. [From *qosh-maq* "to put together".]
قوشولماق	*qosh-ul-maq* (v. pass.) to be joined, to be put together, to be united.
قوشون	*qoshun* (subs.) an army.
قوغا	*qugha* (subs.) a rush (a kind of grass), KAZ.
قوغلاتماق	*qughla-'t-maq* (v. caus.) to cause to pursue.
قوغلاماق	*qughla-maq* (v. tr.) to pursue, to follow.
قوغورچاق	*qughurchaq* (subs.). The same as *qâurchaq.*
قوغون	*qughun* (subs.) a melon.
قول	*qol* (subs.) a hand.
قول	*qol* (numl. subs.) a hundred thousand, KAZ.
قول	*qol* (subs.) a broad open valley between mountains; سریق قول or سریقول *Sariq-qol* or *Sariqol:* "yellow valley;" the name of a valley and small province in the angle between Pamir and the Muzbaq Range (a name often mis-spelt Sirikul, and wrongly applied by Europeans to a Lake on Pamir). کینگ قول *King-qol* "wide valley;" the name of a place on the road between Sariqol and Kâshghar, KIRGHIZ, KAZ.
قولا	*qula* (adj.) reddish dun (the colour of a horse).
قولاق	*qulaq* (subs.) an ear. [Before affixes the *q* usually becomes *gh*, as *qulagh-ing* "thine ear".]
قولاقچه	*qulaq-chah* (subs.) a cap with flaps covering the ears.
قولاقچون	*qulaq-chun* (subs.) a cap with long side (ear) lappets which can be crossed under the chin.
قولان	*qulan* (subs.) a wild ass [*Equus hemi-onus*], (from *qula*).
قولاي	*qulaï* (adj.) easy, propitious.
قولتورماچ	*qulturmach* (subs.) a crutch.
قولتوق	*qultuq* (subs.) the arm-pit.
قولتوقلاتماق	*qultuq-la-'t-maq* (v. caus.) to cause to take under the arms.

قولتوقلاماق	*qultuq-la-maq* (v. tr.) to take under the arm, *viz.*, either to support a person in walking by placing one's hand under his arm, or to carry any object under one's arm.
قولچيليق	*qul-chi-liq* (subs.) slavery, servitude.
قوللوق	*qul-luq* (subs.). For قللوق.
قولوف	*quluf* (subs.) a lock, a padlock, P.
قولون	*qulun* (subs.) a colt, a foal.
قولونلاماق	*qulun-la-maq* (v. intr.) to foal.
قوم	*qum* (subs.) sand.
قومالاق	*qumalaq* (subs.) sheep's dung.
قومتوخي	*qum-tokhi* (subs.) ***Podoces Hendersonii*** (lit. 'sand-fowl').
قومغان	*qumghan* (subs.) a basin.
قوموچاق	*qumuchaq* (subs.) a frog. [The people of Darwâz call it "bulbul-i-Hazrat Ali" (the nightingale of Holy Ali).]
قوموش	*qumush*. For *qamish*.
قوناق	*qunaq* (subs.) a guest; also, a night's lodging. [From *qun-maq*.]
قوناق	*qonaq* (subs.) Indian-corn, maize.
قونان	*qunan* (adj. and subs.) rising three years old; also, any four-legged animal of that age.
قوندورتماق	*qun-dur-t-maq* (v. caus. redup.) to cause to give a night's lodging.
قوندورماق	*qun-dur-maq* (v. caus.) to cause or allow to sit or lie, to give a lodging-place, to house; also, to cause to lodge (as a falconer taking up a hawk on his wrist).
قوندوز	*qun-duz* (subs.) a small animal whose fur is much in request, (? sable); also, fur of that animal.
قونگراغو	*qungraghu* (subs.) a bell.
قونگراق	*qungraq* (subs.) a little bell attached to an animal.
قونگور	*qungur* (adj.) dun. [***Qungur-at*** 'dun horse', corrupted to Qungrat, is the name of one of the divisions of the Middle Horde of Qazzaqs, also of a town in Khiva.]
قونگوز	*qunguz* (subs.) a black beetle.

قونگي يوغان	*qungi-yoghan* (subs.) a boil.
قونماق	*qun-maq* (v. intr.) to lodge, to put up ; also, to dismount.
قوي	*qoï* (subs.) a sheep.
قوياش	*qüyash* (subs.) the sun [rare].
قوياق	*quyaq* (adj.) thick, viscous [of fluids].
قويان	*quyan* (subs.) a hare, KH. KAZ.
قويانگ	*quyang* (subs.) a moveable subcutaneous tumour.
قويچي	*qoï-chi* (subs.) a shepherd.
قويدورماق	*qoï-dur-maq* (v. caus.) to cause to place, to cause to put, to cause to set aside, to cause to leave, to cause to abandon.
قويروق	*quyiruq* (subs.) a tail.
قويما	*qüi-ma* (adj.) cast (of metal).
قويماق	*qoï-maq* (v. tr.) to place, to put, to set aside, to leave, to abandon.
قويماق	*qüi-maq* (v. tr.) to pour, to cast (metal).
قويماق	*qüi-mâq* (subs.) a cake cooked in butter, a butter-cake.
قويوشقون	*quyushqun* (subs.) a crupper.
قويوشماق	*qoï-ush-mâq* (v. recip.) to leave one another.
قويوشماق	*qüi-üsh-maq* (v. recip.) to pour from both sides, to pour together.
قويوق	*quyuq* (adj.). The same as *quyaq*.
قويون	*qoyün* (subs.) the breast of the robe (used as a receptacle or pocket). [? From *qoï-maq*.]
قويون	*qüyün* (subs.) a whirlwind, a 'devil.'
قويي	*qüyi* (subs. and adj.) "lowness," low ; *e. g.*, *aning quyi-sida* "below it," *Hindustân Yarkand-din qüyi* "India is lower than Yarqand."
قه	*qah* (post-pos.) to.
قي	*qï*. (See Gram. p. 262, Pronouns.)
قيا	*qïa* (adj. and subs.) slanting, sloping ; also, a road slanting up a hill-side or on the face of a cliff. [*Sariqa-qïa* "yellow slant," the name of a part of the Upper Qàra-kàsh Valley ; corrupted to Sariqia.] From *qi-maq*.

قياق *qîaq* (subs.) a sharp-edged rush.

قيان *qayan* (adv.) which way, on which side. [For *qaï yan.*]

قيپچاق *qipchâq* (prop. name) one of the divisions of the Middle Horde of Qazzaqs. *Dasht-i-qipchâq* the desert north of the Jaxartes and of Khokand.

قيتيق *qitiq* (subs.) tickling.

قيتيقلاتماق *qitiq-la-'t-mâq* (v. caus.) to cause to tickle.

قيتيقلاماق *qitiq-la-mâq* (v. tr.) to tickle.

قيچرماق *qichir-mâq*
قيچقرماق *qichqir-mâq* } (v. tr.) to call, to cry out.

قيچي *qichi* (subs.) mustard.

قيچيش *qichish* (vl. subs.) a tickling, an itching.

قيچيشقاق *qichish-qaq* (subs.) the itch.

قيچيشماق *qichi-'sh-maq* (v. recip.) to itch all over.

قيچيق *qichiq* (vl. subs.) a tickling.

قيچيماق *qichi-maq* (v. intr.) to experience a tickling or itching sensation, to itch.

قير *qir* (subs.) a ridge, the meeting line of two plane surfaces.

قير *qir* (subs.) water-proof plaster (applied to a bathing-place, tank, &c.)

قيرا *qira* (subs.) a ridge, an edge.

قيراغاچ *qaïraghach* [? for *qara-yaghach* 'black-wood'], an elm.

قيراق *qiraq* (subs.) an edging (of any stuff).

قيراق *qairaq* (subs.) a whet-stone, a hone.

قيرال *qirâl* (subs.) a white frost.

قيراو *qirâo* (subs.) a white frost; a camp of nomads (Kirghiz, &c.).

قيرغاق *qirghâq* (subs.). The same as *qiraq*.

قيرغاول *qirghaol* (subs.) a pheasant. [The same as قرغاول.]

قيرغاي *qirghâi* (subs.) a small species of hawk.

قيرغوچ *qir-ghüch* (subs.) a scraper.

قيرغون *qirghun* (subs.) slaughter (in battle).

قيرغي *qirghi*. The same as *qirghai*.

قیرغیز	*Qirghiz* (prop. name) a race of nomad Turks living in the mountains, from the south of Yarkand round by Pamir and Alaï to the north of Kàshghar and Aksu (the Issik-kul district). They are called by the Russians *Tchorny Kirghiz* (black Kirghiz), also Mountain Kirghiz, to distinguish them from the Qazzaqs of the plains, to whom also (though incorrectly) the name of Qirghiz is applied by the Russians.
قیرق	*qirq* (num.) forty. More often قرق.
قیرماق	*qir-maq* (v. tr.) to scrape, to shave, to erase; also, to kill, [see قُرماق]; also, to spend (time).
قیریق	*qiriq* (vl. adj.) scraped, threadbare, worn down (as the fur of a skin, &c.).
قیریقتورماق	*qiriq-tur-maq* (v. caus.) to cause to shear, &c.
قیریقماق	*qiriq-maq* (v. tr.) to shear, to cut with a pair of scissors.
قیریلماق	*qir-il-maq* (v. pass.) to be scraped, to be turned (in a lathe), to be shaved, to be destroyed utterly.
قیریندی	*qirindi* (subs.) scraping (of leather, a cooking pot, &c.).
قیز	*qiz* (subs.) maiden; also, daughter. The same as قز.
قیزارماق	*qiz-ar-maq.* See قزارماق.
قیزغانچاق	*qizghan-chaq* (adj.) grudging, selfish, churlish.
قیزغانماق	*qizghan-maq* (v. tr.) to grudge, to be churlish, to stint.
قیزیقماق	*qizi'q-maq* (v. intr.) to be eager or hot (over anything).
قیزیق	*qizi'q* (adj.) hot, also eager. Same as قزیق.
قیزیل	*qizil* (adj.) red. Same as قزیل.
قیزیماق	*qizi-maq* (v. intr.) to become hot; also, to become eager. Same as قزیماق.
قیستاتماق	*qista-'t-maq* (v. caus.) to cause to become tight or pressed.
قیستاماق	*qista-maq* (v. tr.) to tighten, to press; also, to importune.
قیستورماق	*qis-tur-maq* (v. caus.) to infix, to stick into (as a flower into the cap).
قیسقا	*qisqa* (adj.) short.
قیسقارتماق	*qisqa'r-t-maq* (v. caus.) to cause to be short, to shorten.

قيسقارماق *qisqa'r-maq* (v. intr.) to become short.

قيسماق *qis-mâq* (v. tr.) to press (sideways).

قيسماق *qismâq* (subs.) a gin (for catching animals).

قيسيلماق *qis-il-maq* (v. pass.) to be pressed.

قيش *qish* (subs.) winter.

قيشايتماق *qishaï-'t-maq* (v. caus.) to cause to be crooked.

قيشايماق *qishaï-maq* (v. intr.) to be or become crooked.

قيشلاق *qish-laq* (subs.) lit. winter-quarters; also, a village [probably so called from having originally only been occupied in winter by the Central Asiatic tribes]; (opposed to *yaï-laq* "summer-quarters or pasturage," answering to the Swiss word 'alp').

قيشليق *qish-liq* (adj.) belonging to or destined for the winter.

قيشيق *qishiq* (adj.) crooked.

قيقرماق *qiqr-mâq* (v. intr.) to try to shout without being able to produce a loud sound (as people afflicted with goître).

قيل *qil* (subs.) horse-hair (for the tail).

قيلدورماق *qel-dur-maq* (v. caus.) to cause to do.

قيلغوچي *qel-ghu-chi* (vl. subs.) a doer.

قيلماق *qel-maq* (v. tr.) to do [very common in composition].

قيلنماق *qel-in-mâq* (v. pass.) to be done.

قيليچ *qilich* (subs.) a sabre.

قيليشيماق *qel-ishi-maq* (v. recip.) to do in company, to do one another [in composition with another verb].

قيليغليق *qeligh-liq* (vl. adj.) done.

قيليق *qel-iq* (vl. subs.) the doing.

قيليقليق *qeliq-liq* (vl. adj.) doing (well), behaving properly; also sometimes used for *qelighliq*.

قيما *qima* } (subs.) mince-meat.
قيماچ *qimach* }

قيمات *qimat* (adj.) dear, highly-priced. [From A.]

قيماق *qi-maq* (v. tr.) to trim, to cut slanting (generally for the purpose of making a side of anything square with the other sides; the slant being considered with reference to the existing edge).

قیماق *qaïmâq* (subs.) cream.

قیماق *qüimaq* (subs.) a butter-cake.

قیمتچیلیک *qimat-chi-liq* (subs.) dearness, scarcity, A. T.

قیمیرلاتماق *qimir-la-'t-maq* (v. caus.) to cause to crawl.

قیمیرلاماق *qimir-la-maq* (v. intr.) to crawl, to creep, to move.

قین *qin* (subs.) a scabbard, a sheath.

قین *qiyün* (adj. and subs.) difficult, troublesome; also, a painful punishment, torture.

قیناتماق *qîna-'t-maq* (v. caus.) to cause to torture.

قینالماق *qîna-'l-maq* (v. pass.) to be tortured; also, to experience difficulty or pain (in doing anything).

قیناماق *qîna-maq* (v. tr.) to torture; also, to give trouble or pain.

قینغراق *qinghrâk* (subs.) a large knife, a hanger.

قینغرایتماق *qinghr-aï-'t-mâq* (v. caus.) to cause to be crooked, to make crooked.

قینغرایماق *qinghr-aï-mâq* (v. intr.) to become crooked.

قینغور *qinghür* (adj.) crooked.

قییاق *qiyâq* (subs.) a sharp bulrush.

قییماق *qayi-maq* (v. intr.) to swim (said of the head).

قیین *qiyin* (subs.). The same as *qiyün*.

قییندی *qiyin-di* (subs.) a cutting of cloth (remaining from the cutting out of a garment).

قیییق *qiyeq* (adj.) crooked.

ک گ

کا *ka*
گا *ga* } (post-pos.) to, onto, into, at (with a sense of 'motion') [written also *gha* and *ka*] *kitàb-ga pitti* = "he wrote in (to) the book;" but *kitàb-da oqudi* = "he read in the book"].

کاپ *kap* (subs.) a case or cover.

کاپتاك *kaptak* (subs.) a playing ball.

کاپسیز *kap-siz* (adj.) impudent (boy) [like a 'gamin'].

کاپشاتماق *kâpsha-'t-mak* (v. caus.) to cause to chew the cud, to cause to chatter.

کاپشاماق *kâpsha-mak* (v. intr.) to chew the cud; also (more commonly), to chatter, to babble.

کاپشوک *kapshuk* (vl. subs.) a chatter-box, a prattler.

کاپکي *kapki* (adj.) gossiping, talkative.

کاروان *karwân* (subs.) a caravan; also applied to any individual merchant, a member of a caravan, P.

کاریز *kâriz* (subs.) a subterranean water-course [formed by digging a line of wells at certain intervals on a hill-slope, connecting the bottoms of these wells by small tunnels; as the foot of the slope is reached the wells get less and less deep till at last the water-course emerges into the open air; in this manner springs at the foot of the hills are tapped and brought to the surface of the land at a lower level. In Eastern Turkistân these *kariz* are found near Turfân only], P.

کاسکي *kaski* (adj. and subs.) idle, gossiping; also, an idler.

کاسه *kasah* (subs.) a cup (of earthenware), P.

کاشغر *Kâshghar* (prop. name) the capital of Eastern Turkistân. [This is the spelling usual among the Western Turkistànis, and which has now been adopted in the coinage of the reigning Amír.]

کاشقر *Kâshqar* (prop. name). The same. [This is the spelling used by the natives of the country both in their every day transactions, and also in their books. It is spelt *Qàshqar* in the 'Kudatku Bilik', an ancient Uïghur poem written in A. H. 462 or A. D. 1069, and lately published with a translation by Prof. Vámbéry.]

کاشکي *kâshki* (interj.) Would to God! P. (?)

کاکا *káká* (subs.) an egg.

گال *gal* (subs.) throat, Y.

گال *gâl* (adj.) blunt, Y.

گالي *ga-li* [a compound affix applied to the root of verbs conveying the sense 'in order to'].

كاليب *kalib* (subs.) a mould, P.

كامشوك *kamshuk* (adj. and subs.) having a retreating chin.

كان *kân* (subs.) a mine, P.

كاواك *kawak* (subs.) a hole.

كاوش *kâush* (subs.) slippers. From P.

كاوش *kâush* (subs.) chewing the cud.

كاوشاتماك *kâusha-'t-mak* (v. caus.) to cause to chew the cud.

كاوشاماك *kâusha-mak* (v. intr.) to chew the cud.

كاولاتماك *kâola-'t-mak* (v. caus.) to cause to dig.

كاولاماك *kâola-mak* (v. tr.) to dig, to excavate.

كايتماك *kâï-'t-mak* (v. caus.) to cause to be angry.

كايماك *kâï-mak* (v. intr.) to be angry, to be vexed, to be tired.

گپ *gap* (subs.) word, speech; a social meeting, a 'conversazione,' P.

كپتاك *kaptak*. The same as كاپتاك.

كپتر *kaptar* (subs.) a pigeon. From P.

كپريك *kiprik* (subs.) an eyelash.

كپشر *kapshar* (subs.) solder; a joint made by soldering. From P.

كپشيك *kapshik* (subs.). The same as كاپشوك.

كپكير *kapkir* (subs.) a ladle, a skimmer. From P.

گپلاشماك *gap-la-'sh-mak* (v. recip.) to converse.

كپيش *kapish* (subs.) slippers. From *kafsh*, P.

كتك *katak* (subs.) a fowl-house.

كتمان *kitman* (subs.) a hoe.

كتمانلاماك *kitman-la-mak* (v. tr.) to hoe.

كتّه *katta* (adj.) great. [The eldest son of the Amir of Bokhâra always bears the title كتّه توره 'Katta-Turah' = 'Great or first Prince'.]

كَج	*kaj* (adj.) crooked, specially perverse, P.
گج	*gaj* (subs.) plaster, mortar.
كجابا كجاوه	*kajaba* *kajawa* } (subs.) camel's panniers (generally for women to travel in), P.
كچكنه	*kich'kinah* (adj.) very small, tiny, little [from *kichik-kinah*].
كچيك	*kichik* (adj.) little, small.
كچيكّنه	*kichikkina* [contr. from *kichik-kina*] (adj.) very small, tiny, little; also (subs.), a very little, a small quantity.
كچماك	*kech-mak* (v. intr.) to pass through (water, &c.), to wade, to ford; to pass by (a fault), to let pass (one's rights); [governs *din*].
كچورماك	*kech-ur-mak* (v. caus.) to cause to pass through or by, to cause to let pass.
گداي	*gadāi* (subs.) a beggar, a pauper. From P.
گدايليق	*gadāi-lik* (subs.) poverty, beggary, P. T.
كَر	*kar* (adj.) deaf, P.
كِر	*kir* (adj.) dirty, soiled.
كُرّ	*kurr* (subs.) a cave, a cavern. From A.
كرا	*kira* (subs.) hire, P.
كراچي	*kira-chi* (subs.) a letter out on hire, P. T.
كِراكش	*kira-kash* (subs.) a carrier for hire, the owner of a troop of horses, &c. who carries merchandise for hire, P.
كِرپي	*kirpi* (subs.) a hedgehog.
كِرپيك	*kirpik* (subs.). The same as *kiprik.*
كَرقولاق	*kar-qulaq* (adj. and subs.) deaf, lit. deaf-eared; also, a deaf man.
كِرگوزماك	*kir-guz-mak* (v. caus.) to cause to enter.
كركي	*karki* (subs.) an adze.
كِرماك	*kir-mak* (v. intr.) to enter, to come in [governs *gha*].
كُز	*küz* (subs.) autumn.

کُزاتچي	*kuzat-chi* (subs.) a guard, a sentry, a care-taker.
کُزاتماک	*kuzat-mak* (v. tr.) to guard, to take care of.
کزاماک	*kuza-mak* (v. tr.) to cut hair (of a horse's mane, &c.) with a knife.
گَزک	*gazak* (subs.) smarting (of a wound, caused by cold air or water getting into it).
گزليک	*gazlik* (subs.) a small knife (for paring the nails, &c.).
کِساك	*kisak* (subs.) a piece, a portion; (in Eastern Turkistân confined to) a piece of brick.
کَسل	*kasal* (adj.) ill, unwell. From A.
کسلماک	*kes-il-mak* (v. pass.) to be cut.
کسماک	*kes-mak* (v. tr.) to cut.
کِسماك	*kismak* (subs.) a shot fired backwards from the back of a horse at full gallop, a Parthian shot.
کشن	*kishan* (subs.) a chain hobble (for a horse).
کشي	*kishi* (subs.) a person, a 'body'; [*kishi* with the negative verb = 'no-body'].
کفتر	*kaftar* (subs.) a pigeon. [For *kaptar*.] From P.
کفش	*kafsh* (subs.) a slipper, P.
کفشر	*kafshar* (subs.) solder, a soldered joint, P.
کفريک	*kifrik* (subs.) an eye lash. Same as *kiprik*.
کفگير	*kafgir*. For *kapgir*.
کل	*kal* (subs.) scald-head; also (adj.), hornless (of a cow, &c.).
کُل	*kül* (subs.) ashes, cinders.
گُل	*gul* (subs.) a flower, P.
کَله	*kalah* (subs.) a cow; (used also in a general way for horned cattle).
کلته	*kalta* (adj.) short.
کلتک	*kaltak* (subs.) a stick, an Alpenstock.
ککليک	*kaklik* (subs.) a red-legged partridge, a 'chikor', ***Caccabis pallidus***, Hume.

ککّوک *kakkuk* (subs.) a cuckoo.

کُلُک *kuluk* (adj.) winning (applied to the horse that comes in first in a race).

کِم *kim* (conj.) that; also (pron.) who?

کَم *kam* (adj. and adv.) little (in amount), P.

کمبغل *kam-baghal* (adj.) poor, indigent [lit. having nothing to carry under his arm], P.

گُمان *gumân* (subs.) doubt, suspicion, P.

گُمانلیک *gumân-liq* (adj.) doubtful, suspicious, suspected; also, *enceinte*, (not implying any concealment of the fact), P. T.

کمر *kamar* (subs.) a girdle or waist-belt, P.

کمرسه *kim-irsa* (pron.) originally, whosoever, whoever [from *kim* 'who' and *irsa* 'may be']; modern usage, a person, any one, some one.

کمپیر *kampir* (subs.) an old man, an old woman, P.

کمچیلیک *kam-chi-lik* } (subs.) paucity, deficiency, scantiness, scarcity.
کملیک *kam-lik* }

کمیتماک *kami-'t-mak* (v. caus.) to cause to become less, to diminish (tr.).

کمیماك *kami-mak* (v. intr.) to become less, to diminish (intr.) P. T.

کنت *kant* } (subs.) a village, a place of settled habitations [the
کند *kand* } termination of many names of places, Yarkand, Tàshkand, &c.].

کنه *kanah* (subs.) a tick. [Kh.

کوب *kub* or *kup* (adj. and adv.) much, many; also, much, very,

کوبه *kuba* (subs.) a mallet.

کوپ *köp* (subs.) a water-butt.

کوپایتماک *köp-aï-'t-mak* (v. caus.) to cause to become much or many, to increase (tr.). [(intr.).

کوپایماک *köp-aï-mak* (v. intr.) to become much or many, to increase,

کوپتورماك *kup-tur-mak* (v. caus.) to cause to ferment.

گوپچک *gupchak* (subs.) the nave of a wheel.

کوپچوک *kupchuk* (subs.) a saddle cushion.

کوپروک *kupruk* (subs.) a bridge.

کوپلاشماك *kup-la-'sh-mak* (v. recip.) to throng together to any work [from an unusual *kup-la-mak*].

کوپلوک *kup-luk* (subs.) many-ness, much-ness, a deal of.

کوپماك *kup-mak* }
کپورماک *kupur-mak* } (intr.) to ferment, to swell, to foam.

کوپوک *kup-uk* (vl. subs.) foam.

کوپه‌لاک *kupah-lak* (subs.) a moth, a butterfly.

کوتارتماک *kutar-'t-mak* (v. caus.) to cause to lift.

کوتارماک *kutar-mak* (v. tr.) to lift, to raise.

کوتارنماك *kutar-'n-mak* (v. refl.) to take one's self off bag and baggage.

کوتاک *kutak* (subs.) a log of wood, a cross-cut portion of a trunk.

کوتان *kütan* (subs.) the gut.

گوججاک *gujjak* (subs.) a shovel.

کوچ *küch* (subs.) strength, power.

کوچ *kûch* (subs.) a march, a migration, P.

کوچ *kûch* (subs.) a wife.

کوچا *kucha* (subs.) a street or lane in a town, P.

کوجا *kuja* }
کوچا *kucha* } (subs.) a vegetable broth, Kh., Kaz.

کوچاندورماک *küch-a'n-dur-mak* (v. refl. caus.) to cause to exert one's self.

کوچانماک *küch-a'n-mak* (v. refl.) to exert one's self, "*s'efforcer,*" to make an effort.

کوچایماک *küch-a-ï-mak* (v. intr.) to become strong.

کوچلوک *küch-lük* (adj.) strong, powerful, [the title given to the Naïman prince from whom Changez Khán conquered the country of Kâshghar].

کوچلوکلیک *küch-lük-lik* (subs.) powerful-ness, mightiness.

کوچماک *kûch-mak* (v. intr.) to march, to migrate, P. T.

کوچوک *kuchuk* (subs.) a puppy.

کوچونماک *kûch-un-mak* (v. refl.) to march one's self about, to wander about without purpose or unnecessarily.

کودا *kûda* (subs.) a grass of a very nourishing nature growing in the mountains, Kaz.

کورّ *kurr* (subs.) a cavern. See کُرّ.

کوراش *kura'sh* (subs.) a wrestling match.

کوراشماک *kura-'sh-mak* (v. recip. ?) to wrestle together (in a friendly way).

کوراك *kura'k* (subs.) a shovel, Khok.

کوراماگ *kura-mak* (v. tr.) to shovel away, to throw (snow, earth, &c.) up with a shovel.

کورپا *kürpa*
کورپه *kürpah* } (subs.) a counterpane, Kh.; also, lamb-skin, Y.

کورساتماک *kûr-sat-mak* (v. caus.) to cause to see, to show.

کورشپهلاک *kur-shapalak* (subs.) a bat, P. T.

گورکوراک *gurkura'k* (vl. subs.) thunder.

گورکواماک *gurkura-mak* (v. intr.) to thunder.

کورگوزماک *kûr-guz-mak* (v. caus.) to cause to see, to show.

کورماک *kûr-mak* (v. tr.) to see, to look. "*Obdân kurmaq*" to be pleased.

کوروشماك *kûr-ush-mak* (v. recip.) to see one another; to have an interview.

کوروکسیز *kûr-uk-siz* (vl. adj.) un-seemly, un-sightly.

کوروکلیک *kûr-uk-lik* (vl. adj.) seemly, sightly, well-favoured, well-made.

کورولماک *kûr-ul-mak* (v. pass.) to be seen.

کوروملوک *kûr-um-luk* (vl. adj.) worthy of being seen.

کورونماک *kûr-un-mak* (v. refl.) to make one's self (or itself) seen, to appear.

کوز *köz* (subs.) an eye.

کوز *küz* (subs.) autumn.

کوزا *köza* (subs.) a pitcher, P.

كوزاتچي *küz-at-chi* (subs.) a watchman, a sentry; lit. a looker after.

كوزاتماك *küz-at-mak* (v. caus. ?) to look after, to take care of.

كوزتيكماک *köz-tik-mak* (comp. v. intr.) to fasten the eyes on; lit. to sew the eyes.

كوزتيگماک *köz-tig-mak* (comp. v. intr.) to strike (said of the evil eye) [governs *gha*]. Conjugated in the 3rd pers. sing.

كوزچي *köz-chi* (subs.) a good judge (of horseflesh, &c.). Lit. an eye-er.

كوزلاماك *koz-la-mak* (v. tr.) to keep one's eye upon, to watch from a distance.

كوزلوک *köz-luk* (subs.) dark spectacles to protect the eye, made of hair; also, the stone of a ring, &c.

كوزلوک *köz-luk* (adj.) far-sighted, long-sighted; also, gifted with the evil eye [supposed to be a great advantage as the possessor can compel the sale to him of any horse, &c., that he takes a fancy to, under penalty of causing it to die if it be refused to him].

كوزوكماک *köz-ük-mak* (v. intr.). The same as *köz-tigmak*.

كوسا *kosa* (adj.) beardless, with only a few straggling hairs on the face, P.

كوساتماک *kosa-'t-mak* (v. caus.) to cause to stir (the fire).

كوساماک *kosa-mak* (v. tr.) to stir (the fire).

كوساو *kosao*
كوساي *kosaï* } (subs.) a piece of wood for stirring the fire, a poker.

كَوش *kaush* (subs.) slippers. The same as كوس &c., P.; also, chewing the cud.

گوش *gôsh* (subs.) meat [for *gôsht*, P.].

كَوشاماک *kausha-mak* (v. intr.) to chew the cud. [Camels are watched before purchase, to see whether they perform this operation properly. If they do not move their jaws laterally at least 25 times before swallowing again, they are not considered to be in good health. In that case it is said: *kaush-i buzuldi* "its chewing is spoilt".]

کوفهلاک *kufah-lak* (subs.) a moth, a butterfly. The same as *kupah-lak*.

کوفروک *kufruk* (subs.) a bridge. The same as *kupruk*.

کوفوک *kufuk* (subs.) foam. The same as *kupuk*.

کوک *kok* (subs.) a leather thong forming the pivot of the trellis-work of a Kirghiz tent.

کوک *kök* (subs.) the sky. Also (adj.), blue; also, green.

کوکارتماك *kök-ar-'t-mak* (v. caus.) to cause to be blue, to make blue (or green).

کوکارماك *kök-ar-mak* (v. intr.) to become blue (or green).

کوکراماك *kök-ra-mak* (v. intr.) to thunder.

کوکراك *kökrak* }
کوکشي *köksi* } (subs.) breast, chest.

کوکشون *kokshun* (adj.) aged, decrepit, in extreme old age; also, an intriguer, a mischief-maker.

کوکلاماك *kok-la-mak* (v. tr.) to stitch roughly, to tack; to fasten two wands together by a leather thong passed through them forming a pivot, [the sides of a Kirghiz tent are formed of wands thus fastened together into a trellis-work which can be folded up for travelling, or else extended and set upright round the circumference of a circle, and then covered with felts to form the sides of the tent].

کوکلاماک *kök-la-mak* (v. intr.) to become blue or green, to send forth leaves (of a tree).

کوکماک *kokmak* (subs.) a wild sheep [*Ovis nahura*].

کوکنار *koknâr* (subs.) the poppy, P.

کوکیش *kök-ish* (adj.) bluish, greenish.

کول *kül* (subs.) a lake, a pond, a tank [common in the geography of Central Asia as *Issiq-kül* (warm lake), *kara-kül* (black lake); but not "*Sirikül*" (as sometimes spelt by Europeans), see *Sariq-qol* or *Sariqol*].

کولاتماک *kau-la-'t-mak* (v. caus.) to cause to dig.

کولاگه *kulagah* (subs.) shade, shadow.

کولاماك	*kau-la-mak* (v. tr.) to dig, to excavate.
کولانگ	*kulang* (subs.) daily bread.
کولانکه	*kulankah.* For *kulagah*, KAZ.
کولدورماك	*kül-dür-mak* (v. caus.) to cause to laugh.
کولکي	*külki* (adj.) laughable.
کولماك	*kül-mak* (v. intr.) to laugh.
کولموس	*kulmus* (adj.) miserly.
کوماك	*kumak* (subs.) help, assistance.
کوماك	*kumak* (adj.) toothless, whose mouth retreats from want of teeth.
کوماکچي	*kumak-chi* (subs.) a helper, an assistant.
کوماکلاشماك	*kumak-la-'sh-mak* (v. recip.) to assist one another, to do any thing conjointly.
کوموش	*kumush* (subs.) silver.
کون	*kön* (subs.) the sun ; also, a day.
کون	*kün* (subs.) women connected by being the wives of the same husband.
کون	*kûn* (subs.) common leather (cow's or camel's hide).
کوناولتورشي	*kön-ulturush-i* (subs.) sun-set ; lit. sun's sitting down.
کونباتشي	*kön-bâtish-i* (subs.) sun-set ; lit. sun's sinking.
کونتوغوشي	*kön-tughush-i* (subs.) sun-rise ; lit. sun's birth.
کونجيت	*kunjit* (subs.) the grain sesame, P.
کونچقشي	*kön-chikish-i* (subs.) sun-rise ; lit. sun's coming.
کونچي	*kun-chi* (subs.) a leather-worker.
کونچي	*kün-chi* (subs.) a jealous person (? from *kün* the name applied to the connection between two women who are wives of the same husband).
کونچيلاشماك	*kün-chi-la'sh-mak* (v. recip.) to be jealous of one another.
کونچيلاماك	*kün-chi-la-mak* (v. intr.) to be jealous. [man.
کونداش	*kündash* (adj.) connected by being the wives of the same
کوندورماك	*kun-dur-mak* (v. caus.) to cause to become trained, to train to educate.
کوندوز	*kön-döz* (subs.) day-time.

کونگل	*küngl*	(subs.) heart (chiefly used metaph. for 'mind,' &c.).
کونگلاک	*küngl-ak*	(subs.) a coat or shirt not opening at the breast.
کونگلچاک	*küngl-chak*	(adj.) merciful-hearted.
کونگللیک	*küngl-lik*	(adj.) pleasing to the heart ; also adv., heartily, with pleasure.
کونلاشماک	*kün-la-'sh-mak*	(v. recip.) to be jealous of one another.
کونلاماک	*kün-la-mak*	(v. intr.) to be, or become jealous.
کونلوک	*kön-lök*	(subs.) a parasol, a sun-shade.
کونلوک کونلیک	*kön-lök* *kön-lik*	(adj.) daily.
کونماک	*kun-mak*	(v. intr.) to become trained, to receive an education.
کویا	*küya*	(subs.) smut, the blackness formed on the outside of a kettle, black (of any kind applied or formed on any object).
کویا	*küya*	(subs.) a grub which destroys garments.
کویاگو کویاو	*küyagu* *küyao*	(subs.) a son-in-law.
کویدورگو	*küidurgu*	(subs.) a malignant pustule, [so called because it is cured by inserting a hot needle].
کویدورماک	*küi-dur-mak*	(v. caus.) to cause to burn (intr.), to burn (tr.), to set fire to.
کویلاک	*küilak*	(subs.). The same as *kunglak*.
کویماک	*küi-mak*	(v. intr.) to burn, to be burnt.
کویوک	*küy-ük*	(adj.) burnt.
که گه	*kah* *gah*	(post-pos.) to, at, into, onto. [See *kâ*, *gâ*.]
کی گی	*ki* *gi*	(relve. affixes). See Gram. p. 312, Syntax.
کیپاک	*kipak*	(subs.) bran.
کیپتورماک	*kep-tur-mak*	(v. caus.) to cause to become dry, to dry (tr.).
کیپماک	*kep-mak*	(v. intr.) to become dry, to dry [said of clothes, &c.].

کیتارماک	*ket-ar-mak* (v. caus.) to cause to go away, to remove [any living being, a spot on a garment, &c.].
کیتکورماک	*ket-kur-mak*
کیتکوزمای	*ket-kuz-mak*
کیتماک	*ket-mak* (v. intr.) to go away.
کیتورماک	*ke'-tur-mak* (v. caus. from *kel-muk* corr.) to cause to come, to bring.
کیچ	*kech* (adj. and adv.) towards evening, late in the day.
کیچقورون	*kech-qurun* (adv.) late in the day.
کیچک	*kichik* (adj.) small, little.
کیچکنه	*kich'k-'inah* (adj.) tiny, little, very small.
کیچماک	*kích-mak* (v. intr.) to ford, to pass through (a river), to pass by (or abandon one's rights). [Governs *din.*]
کیچورماک	*kích-ur-mak* (v. caus.) to cause to ford, to cause to pass by, &c.
کیچه	*kechah* (subs.) night.
کیچیک	*kichik.* The same as کیچک.
کیچیک	*kích-ik* (vl. subs.) a ford.
کیچیککنه	*kichik-kinah* (adj.) tiny, little.
کیچیکمای	*kech-ik-mak* (v. intr.) to delay, to be late.
کیدورماک	*ki-dur-mak* (v. caus.) to cause to put on (clothes).
کیر	*kirr* (adj.) dirty, soiled.
کیرا	*kira.* The same as کرا.
کیراک	*kirăk* (adj.) necessary, needful [often used as an impersonal verb in the sense of "it is necessary" with the infinitive of another verb].
کیراکلیک	*kirăk-lik* (subs.) the needful, necessaries.
کیرپی	*kirpi* (subs.) a hedgehog.
کیرگوزماك	*kir-guz-mak* (v. caus.) to cause to enter, to bring in.
کیرماك	*kir-mak* (v. intr.) to enter, to come or go in.
کیز	*kíyiz* (subs.) felt. See *kíghiz.*
کیزاك	*kezak* (subs.) turn, order, succession.
کیزدورماك	*kez-dur-mak* (v. caus.) to cause to walk about.
کیزماك	*kez-mak* (v. intr.) to walk about.

كیزوك	*kizuk*	(subs.) a contagious fever.
كیساك	*kesak*	(subs.) a piece (of any thing); specially, a piece of brick, [prob. from *kes-mak*].
كیستورماك	*kes-tur-mak*	(v. caus.) to cause to cut.
كیسماك	*kes-mak*	(v. tr.) to cut.
كیسوك	*kes-uk*	(vl. subs.) a cut, a notch.
كیسه	*kisah*	(subs.) a bag attached to the girdle, P.
كیشان	*kishân*	(subs.) a hobble, a short chain fastening together a horse's forelegs.
كیشي	*kishî*	(subs. and pron.) a person; any-one, some-one, *e. g. obdân kishi* "a good person;" *kishi kel-ma-di* "no one came."
كییك	*kiik*	(subs.) a wild goat, or sheep, or antelope, [applied generally to all wild animals of those sorts, which are afterwards distinguished by their specific names, as: *sâi-kiik-i*, lit. "desert *kiik*" (*Saiga Tartarica?*), *tâgh-kiik-i* "mountain *kiik*" (includes ibex, *Ovis Polii*, &c.)].
كیكاچ	*kekach*	(adj.) stuttering, stammering, having an impediment in one's speech.
كیكاك	*kekak*	
كیكاچلاماك	*kekach-la-mak*	(v. intr.) to stutter, to stammer.
كیكاكلاماك	*kekak-la-mak*	
كیكایتماك	*kekaï-'t-mak*	(v. caus.) to cause to be haughty.
كیكایماك	*kekaï-mak*	(v. intr.) to be haughty, to give one's self airs.
كیكرتاك	*kikar-tak*	(subs.) the wind-pipe.
كیكرتماك	*kikar-'t-mak*	(v. caus.) to cause to eructate.
كیكرماك	*kikar-mak*	(v. intr.) to eructate.
كیكروك	*kikar-uk*	(vl. subs.) an eructation.
كیگورماك	*ki-gur-mak*	(v. caus.) to cause to put on (clothes).
كیگوزماك	*ki-guz-mak*	
كیگیز	*kigiz*	(subs.). Same as *kighiz*.
گیلام	*gilam*	(subs.) a carpet, P.
كیلتورماك	*kel-tur-mak*	(v. caus.) to cause to come, to bring.
كیلتورولماك	*kel-tur-ul-mak*	(v. caus. pass.) to be brought.

کیلشتورماك	*kel-ish-tur-mak* (v. recip. caus.) to cause to come to a good result, to bring to a satisfactory conclusion.
کیلشماك	*kel-ish-mak* (v. recip.) to come together; specially, to come to a good result.
کیلماك	*kel-mak* (v. intr.) to come. [KAZ.
کیلي	*keli* (subs.) a large mortar (in which rice, &c. is pounded),
کیلیچاك	*keli-chak* (subs.) a small hand-mortar (see *kéli*), KAZ.
کیلین	*kelin* (subs.) a daughter-in-law.
کیلینچاك	*kelin-chak* (subs.) a daughter-in-law (thus called while still a bride), KAZ.
کیم	*kim* (conj.) that; also, (pron.) who. See کِم.
کیماك	*kí-mak* (v. tr.) to put on (clothes), to wear.
کیمرسه	*kim-ersa* (pron.) lit. who-ever, whoso-ever ("it may be"), but usually some one [same as *kishi*] (no longer common).
کیمرماك	*kimar-mak* (v. tr.) to gnaw, KAZ.
کیمسان	*kimsán* (subs.) a gold-tinted leather.
کیموک	*kimuk* (subs.) cancellated bony tissue.
کیمه	*kímah* (subs.) a vessel, a ship, a boat.
کِین	*kíin* (subs.) the rear, the back part; also, (adv.) afterwards, behind; also, (post-pos.) after, behind [governs *din*]; *kíin-ga* "backwards," *kíin-i-ga* "towards" or "to the back of it" (definite).
کیندوک	*kindük* (subs.) the navel.
کینگ	*kíng* (adj.) wide, broad, extended; also, roomy, capacious.
کینگاش	*kingash* (subs.) counsel, advice, deliberation.
کینگاشماک	*kingash-mak* (v. intr.) to deliberate, to take counsel [? recip. of *kingaï-mak*; quasi "to open (one's mind) to one another"].
کینگالماک	*king-a'l-mak* (v. pass.) to be made wide or open.
کینگایتماک	*king-aï-'t-mak* (v. caus.) to cause to become open or wide.
کینگایماک	*king-aï-mak* (v. intr.) to become wide or open, to expand.
کینگچیلیک	*king-chi-lik* } (subs.) wideness, expansion.
کینگلیک	*king-lik*

کینه *kînah* (subs.) jealousy, P.

کینهتوتماق *kînah tut-mâq* (comp. v. intr.) to be jealous, P. T.

کینهلاشماك *kînah-la-'sh-mak* (v. recip.) to be jealous of one another, P. T.

کینهلاماك *kînah-la-mak* (v. intr.) to be jealous.

کینیچه *kîin-i-chah* (adv.) backwards: *kîin-i-chah ket-mak* "to retire," "to back (of a horse);" *kîin-i-chah tur-mak* "to turn the back on."

ل

لا *là* (part.) a particle expressive of multitude: *e. g. là-u-lashkar* "the whole army", "the army and all."

لابا *lâbâ* (subs.) the marks of the (Qàlmàq) Buddhist religion [Lama].

لابر *lâbar* (subs.) title of an officer commanding a corps of infantry (500 men).

لاپوللاماک *lapul-la-mak* (v. intr.) to flap to and fro (with the wind).

لاتّه *latta* (subs.) a rag. Also a kind of flowered silk stuff.

لاچه *lâchah* (subs.) sealing-wax.

لاچاک *lachak* (subs.) a handkerchief thrown by women over the backs of their heads to cover their hair, when praying or going into any public place. Also, a kind of turban or tiara worn by Kirghiz women.

لاچیق *lachiq* (subs.) a temporary shed in a melon garden, &c., to shelter the person who looks after it, "a lodge in a garden of cucumbers."

لاچین *lâchîn* (subs.) a kind of hawk.

لار *lar.* The plural affix.

لاس *lâs* (subs.) refuse silk.

لاش *lash* (subs.) green slime (formed on stagnant water, &c.).

لاف *lâf* (subs.) false boasting, a drawing of the long bow, P.

لاق *lâq.* An affix forming nouns of locality. *E. g. yaï-lâq* "summer quarters" (pastures in the mountains, 'Alps' in the Swiss sense); *qish-laq* "winter quarters" (this name formerly applied by the nomad inhabitants of Central Asia to the places where they spent the winter, has now become applied to all settled habitations or villages); *Su-laq* "a watering-place (of cattle);" *Ot-laq* "a grassy place," &c.

لاک *lâk* (subs.) sealing-wax, P.

لان *lan.* An affix forming numeral substantives. *E. g.* "*ochaolan* "a group of three." See Grammar, p. 308.

لانگار *langar* (subs.) an anchor (or rather a heavy object used instead of an anchor), P. Also, a halting-place, a rest-house, Y.

لانکه *lankah* (subs.) linen (? Nankeen).

لاور *lâwar.* See *lâbar.*

لاي *lâi* (subs.) mud, clay, P.

لايچي *lâi-chi* (subs.) a worker in clay, one who makes walls, &c. of mud, P. T.

لايلاتماق *laï-la-'t-maq* (v. caus.) to cause to become muddy, to muddy (tr.), P. T.

لايلاماق *lâi-la-maq* (v. intr.) to become muddy. Also, to float, P. T.

لايليق *lâi-lik* (adj.) muddy. Also the name of the second stage from Yarkand on the Aksu road, P. T.

لب *lab* (subs.) a lip, an edge, P.

ليچك *lachak.* See لاچک.

لك *lak* (num.) a hundred thousand, P.

لكلك *laklak* (subs.) a stork, A.

لوخ *lukh* (subs.) a rush (grass).

لوق *luq.* See *lik.*

لوک *luk.* The same as *lâk.*

لوملوم *lum-lum* (subs.) a composition resembling india-rubber.

لونج *lunj* (subs.) the inside of the cheek, P.

لونقا *lungqa* (subs.) a flower-pot.

لونگي *lungi* (subs.) a scarf used as turban or waist-scarf chiefly used by the Afgháns, P.

ليق *liq*
ليك *lik*
An affix used in forming adjectives from substantives, and also abstract nouns from other nouns or from adjectives. It takes various forms according to the letters of the word to which it is affixed. See Gram. Euph. Changes.

م

ماتال *matâl* (subs.) a proverb, a saying, Kaz.

ماتانگ *matang* (subs.) a kind of sweetmeat, (? Ch.).

ماتاو *mâtâo* (subs.) a number of animals picketted together to a single rope, a chain-gang of criminals similarly fastened, Kaz.

ماجان *majân* for *marjân* (subs.) coral, A.

ماچ *mâch* (subs.) paste made of the fine dust collected from a flour mill.

ماراق *mârâq* (vl. subs.) a place of ambuscade or of secret observation (of an enemy).

ماراقچي *mârâq-chi* (subs.) an ambush, men placed so as to observe the enemy without being themselves seen.

مارال *mârâl* (subs.) the female of the 12-tined stag of Eastern Turkistán.

مارالباشي *Mârâl-bâshi* (prop. name.) a town founded by the Chinese near Laï-Masjid, at the junction of the roads from Yarkand and Kashghar to Aksu.

مارالي *mârâli* (subs.) leather prepared from the skins of the 'mârâl.'

ماراماق *mâra-mâk* (v. tr.) to watch from a concealed post of observation, to lie in ambush.

مارداچ *mardach* (adv.) tailor-wise (used of a mode of sitting), Kaz.

ماروزه *mârozah* (subs.) a small carpet.

مازار *mâzâr* (subs.) a tomb of a holy man (which is revered as a shrine and ornamented with flags and yak-tails fastened to long poles, also often with horns of wild animals). The cairns, which one meets with throughout the mountains separating India from Turkistân, on all noticeable spots such as Passes, &c. are, in the parts of these mountains inhabited by the Musalmans, honoured with the title of "Mâzâr" and considered to be the tombs of ancient worthies, A.

مازاق *mazâq* (subs.) a joke, (corr. A.).

ماش *mâsh* (subs.) a kind of pulse, P.

ماشا *mâsha* (subs.) candle-snuffers; also, the fork in wich the match of a match-lock gun is fixed.

ماشاق *mâshaq* (subs.) gleanings.

ماشوت *mâshüt* (subs.) raw silk.

ماقال *mâqâl.* See *matâl.*

ماقتاتماق *mâqta-'t-maq* (v. caus.) to cause to praise.

ماقتاماق *mâqta-maq* (v. tr.) to praise.

ماقتانما *mâqta-'n-maq* (v. refl.) to praise one's self, to boast.

ماکو *mâku* (subs.) a shuttle (generally made of horn).

مالا *mâla* (subs.) a bush-harrow, a rake, an instrument for covering seed with earth after sowing.

مالدورماق *mâl-dur-mâq* (v. caus.) to cause to dip.

مالماق *mâl-mâq* (v. tr.) to dip, specially into a dyeing vat.

ماما *mâmâ* (subs.) a grandmother, an old woman.

ماموق *mâmuq* (subs.) cotton, KAZ.

مانتو *mantu* (subs.) a small meat-dumpling baked in steam.

مانتوپز *mantu-paz* (subs.) a baker of 'Mantus.'

مانتوچي *mantu-chi* (subs.) a pimp, KASHGHAR.

مانگدورماق *mang-dur-mâq* (v. caus.) to cause to walk.

مانگراشماق *mangra-'sh-mâq* (v. recip.) to bleat to one-another (of sheep or goats).

مانگراماق *mangra-mâq*, (v. intr.) to bleat, to baa (used of sheep and goats).

مانگقا *mangqa* (subs.) a running from the nose; also, a dangerous illness in horses.

مانگلاي	*manglâi* (subs.) the forehead.
مانگماق	*mang-mâq* (v. intr.) to walk, to go, to progress in any manner (physically).
مانگيش	*mang-ish* (vl. subs.) movement, pace.
ماي	*mâi* (subs.) fat, grease, butter, Kaz.
مايا	*mâya* (subs.) capital, original sum invested, P.
ماياق	*mayaq* (subs.) sheep's droppings.
مايدا	*maïda* (subs.) fine powder, P.
مايدالاماک	*maïda-la-maq* (tr.) to reduce to powder.
مايروق	*mâiruq* (adj.) twisted, crippled, Kaz.
مايمون	*maïmûn* (subs.) a monkey, A.
مدراماک	*midra-mak* (v. intr.) to move.
مرجان	*marjân* (subs.) coral, A.
مسکه	*maskah* (subs.) fresh butter, P.
مشرب	*mashrab* (subs.) a social re-union with music, &c.
مشق	*mashq* (subs.) practice drill, military exercises, A.
معقول	*ma'qul* (adj.) lit. reasonable; commonly used for well, all right, A.
معقوللاشماق	*ma'qul-la-'sh-maq* (v. recip.) to come to an agreement together.
معقوللاماق	*ma'qul-la-maq* (v. intr.) to come to an agreement, to agree to.
ملتيق	*milteq* (subs.) a gun, a musket.
ملتيقچي	*milteq-chi* (subs.) a gunner, a musketeer.
من	*man* (pron.) I.
منم	*men-em* (pron.) my, Kaz, [for *maning*].
منمنليک	*man-man-lik* (subs.) egotism, self-conceit.
منه	*manah* (interj.) here! "*voici!*"
مو	*mu* interrogative affix. See Grammar.
مو	*mu* for *bu* in oblique cases.
موچه	*muchah* (subs.) the hind-quarters of a sheep, Kaz.
موچل	*muchàl* (subs.) the cycle of 12 years (each of which is named after an animal). See Grammar.
موجوتماق	*muju-'t-maq* (v. caus.) to cause to pulverize in the hands.

موجوماق *muju-maq* (v. tr.) to rub between the fingers, to rub to powder in the hands; to bring down the pride (of any one); also, to scrape the meat off a bone [in this last sense used only by the Kazzaks].

موچین *múchin* (subs.) tweezers (with which the Turks of Yarkand and Kàshghar used to pull out the hair of their faces out of compliment to their beardless masters the Chinese) P.

موری *mori* (subs.) a gutter; also, a chimney, ? P.

موز *muz* (subs.) ice.

موزات *muzât* properly *muz-art* (from *muz* "ice" and *art* old Turki for a "Pass") prop. name of a Pass on the road from Aksu to Ila.

موزای *muzaï* (subs.) a calf.

موزتاغ *muz-tâgh* (subs.) a glacier; also, a snowy mountain. (See Remarks regarding the application of such words as proper names, under *Aq-tàgh.*)

موزلوق *muz-luq* (adj.) icy, covered with ice.

موشاک *mushak* (subs.) a fire-work, a rocket, a squib.

موشوق *müshük* (subs.) a cat.

موشلاماک *mush-la-mak* [for *musht-la-mak*] (v. tr.) to strike with the fist, P. T.

موغال *Mughal* }
موغول *Mughul* } (prop. name) Mongol.

مول *mol* (adj.) plentiful, abundant, Kh.

مولا *mola* (subs.) a pack-saddle.

مولّا *mulla* (subs.) an educated person, one who has learnt to read and write, P.

مولتان *Multân* (prop. name). A name applied in Yarkand to all Shìas, since a party of Multâni Shìas made themselves notorious by their misconduct some years ago in that town.

مولون *molûn* (subs.) a wild-cat.

موم	*mum* (subs.) wax ; *âk-mum* "bee's wax" ; *kara-mum* "cobbler's wax," P.
مونجاق	*munjaq* (subs.) a coloured bead.
مونچه	*mun-chah* (adv.) thus much, (from *bu* which see, and *chah*).
مونداغ	*mun-dagh* (adv.) thus.
مونده	*mun-dah* (adv.) here.
مونگ	*mung* (subs.) sorrow, care.
مونگایمان	*mung-aï-mâq* (v. intr.) to become sorrowful.
مونگداشماق	*mung-da-'sh-maq* } (v. recip.) to impart one's griefs to one-another.
مونگلاشماق	*mung-la-'sh-maq* }
مونگوز	*munguz* (subs.) a horn.
مهربانچیلیق	*mihrbân-chi-liq* (subs.) kindness, graciousness, P. T.
مهمانچیلیق	*mihmân-chi-liq* (subs.) hospitality, P. T.
میجز	*mijâz* for *mizâj* (subs.) health ; also, disposition, temper, P.
میخ	*mekh* (subs.) a nail, a peg, P.
میخلاتماق	*mekh-la-'t-maq* (v. caus.) to cause to nail, P. T.
میخلاماق	*mekh-la-maq* (v. tr.) to nail, P. T.
میدیراتماك	*midira-'t-mak* (v. caus.) to cause to move, to move (tr.)
میدیراماك	*midira-mak* (v. intr.) to move, to creep.
میدیرلاماك	*midir-la-mak* (v. intr.) to move about, to creep about.
میرده	*maïrdah* (adv.) here [for *bu* or *ma-yer-dah* 'in this place'].
میس	*mis* (subs.) copper, P.
میسقاچه	*mis-qachah* (subs.) a copper vessel, P. T.
میشیق	*mishiq* (subs.) a cat.
میکان	*m'ikan* } interrogative or dubitative form of the Indef. Part. of the defective verb *irmak* or *imak*) is ? whether ? [See Grammar.]
میکین	*m'ikin* }
میلتیق	*milteq* (subs.) a gun.
مَیل	*maïl* (subs.) inclination, choice, A.
مین	*min* (pr.) I, KAZ, KIRGH.
میدجاق	*minjaq*. See *munjâq*.
میندورماق	*min-dur-mak* (v. caus.) to cause to ride, to mount (any-one).

مینشماک *min-ish-mak* (v. recip.) to ride together.

مینگ *ming* (num.) a thousand.

مینگ *ming* (subs.) a beauty-spot, a mole on the face.

مینگاشماق *min-ga-'sh-mak* (v. recip.) to ride two together on one [horse.

مینگه *mingah* (subs.) the brain.

مینماک *min-mak* (v. tr.) to mount a horse, to ride, "*monter à* [*cheval.*"

مینه *mina* (interj.) here! "*voici!*"

مییه *miyah* (subs.) the brain.

ن

نابات *nâbât* (subs.) sugar, P.

ناچار *nâchâr* (adj.) helpless, P.

ناچارلیق *nâchâr-liq* (subs.) helplessness, P. T.

نار *nâr* (subs.) a single-humped camel, like those of India.

نارآق *nar-râq*. For *nari-râq*.

ناري *nari* (adv. and post-pos.) beyond, on the further side. [This is perhaps merely a contraction of *an-yeri* (*'nyeri* that place). At any rate, it may be used precisely as if it were a compound of pronoun and substantive; *e. g. saning nari-'ng gha* "to thy further side" (where it takes both the possessive termination and dative post-position); *uï-din nari* or *nari da* "on the further side from (of) the house." See Grammar. But it has also the properties of a simple adverb, in that it can take the comparative form, see next word.]

ناریراق *nari-râq* (adv. comparative) further, beyond, more on the other side.

ناز *nâz* (subs.) blandishments, endearments, P.

نازلاتماق *nâz-la-'t-maq* (v. caus.) to cause to endear himself, P. T.

نازلانماق *nâz-la-'n-maq* (v. refl.) to endear one's self, P. T.

نازلیق *nâz-liq* (adj.) endearing, using blandishments.

نازوک *nâzuk* (adj.) delicate, tender, P.

ناس *nâs* (subs.) snuff (generally put into the mouth under the tongue and retained there for some time), P.

ناسوار *nâswâr.* The same, P.

ناسوال *nâswâl.* The same.

ناسواي *nâswai.* The same, Kaz.

ناشباتي *nâshbati* }
ناشواتي *nâshwati* } (subs.) a pear, P.

ناشته *nâshtah* (subs.) an early breakfast, a morsel eaten on first getting up, '*choti haziri,*' P.

ناغارا *naghâra* (subs.) a large kettle-drum, P.

ناغاراچي *naghâra-chi* (subs.) a kettle-drummer, P. T.

ناك *nâk* (subs.) a pear.

ناموس *namus* (subs.) an indignity, a disgrace, A.

ناو *nâo* } (subs.) the wooden spout or channel which carries
ناوا *nâwa* } the water to the wheel of a water-mill, P.

ناوات *nâwât.* See *nâbât.*

ناي *naï* (subs.) a reed, a fife, P.

نايچي *naï-chi* (subs.) a fifer, P. T.

نيچند *ni-chand* (pron.) several, P. T.

نيچوك *ni-chuk* (adv.) how? in what manner? thus, so.

نيچه *ni-chah* (pron.) how many? how much?

نسخه *nuskhah* (subs.) model; also, pattern, design, drawing, A.

نغارا *naghara.* See ناغارا.

نغمه *naghmah* (subs.) music, melody, P.

نغمه‌چي *naghmah-chi* (subs.) a musician, P. T.

نمرسه *nimarsah* [*ni-'m-ersa*] (pron.) some thing [lit. "what-ever (it) may be." It preserves the memory of its origin sufficiently to avoid taking affixes or post-positions as a rule, excepting sometimes that of the accusative].

نمه *ni-mah* (pron.) what? also, something. [See Grammar, Pronouns.]

ننگ *ning* or *nang* or *nung.* The affix of the Genitive case; in early Turki "property," "possession."

ني *ni* (pron.) what? Also (post-pos.) the affix of the Accusative case.

ني *naï*. See ناي.

نيتاك *ni-tak* (adv.). The same as *ni-chuk*. [Almost obsolete.]

نيچوك *ni-chuk*. See نچوك.

نيچغدا *ni-châgh-da*
نيچقدا *ni-châq-da* } (adv.) at what time? when?

نيچاغليق *ni-châgh-liq* (pron.) what, at a guess? about how much? [See *châgh*.]

نيچون *ni-'chun* [for *ni-uchun*] (adv.) why? for what reason?

نيچه *ni-chah*. See نچه.

نيچه *naï-chah* (subs.) a little reed, specially one placed in a shuttle and on which the thread is wound.

نيمشقه *nim'ish-qa* (adv.) to what purpose? wherefore?

نيمه *nimah*. See نمه.

نينگ *ning*. The affix of the Genitive case. See Grammar.

نيرسه *niersah* [*ni-ersa*]. The same as *nimarsah* [constructed with *ni* instead of *nima*].

و

و *u* an affix corresponding with our "isn't there," "does'nt it."

ه

هاردورماق *hâr-dur-mâq* (v. caus.) to cause to be tired, to tire, (tr.).

هاردوق *hârduq* (subs.) fatigue, tiredness.

هارماق *hâr-mâq* (v. intr.) to be tired, to feel fatigue.

هاريتماق *hâr-it-maq* (v. caus.) to cause to be tired.

هانگ *hang* (subs.) a cliff, a precipice, Y.

هانگغوت *hangghut* (subs.) the ruddy sheildrake, *Casarea rutila*.

هانگو *hangu* (subs.) name of a tree from whose hard wood cups are made, (?) a kind of poplar.

هانگي *hangi* (subs.) a jack-ass.

هايداماك	*haïda-mak* (v. tr.) to drive, to drive away.
هركاچان	*har-kachan* (adv.) whenever, whensoever (lit. 'every when').
هورماک	*hur-mak* (v. tr.) to blow away (with the mouth).
هورکاک	*hür'-kak* (adj.) shying (of a horse), easily frightened.
هورماك	*hur-mak* (v. intr.) to bark (of a dog).
هوروکماك	*hürük-mak* (v. intr.) to shy [for *hürük-kak* (?)].
هوروکوتماک	*hürük-üt-mak* (v. caus.) to cause to shy.
هوکوز	*hukuz* (subs.) a bullock, an ox.
هول	*höl* (adj.) wet, damp.
هولچيليک	*höl-chi-lik* } (subs.) wetness, humidity.
هوللوک	*höl-lök* }
هوللاماك	*höl-la-mak* (v. tr.) to wet.
هي هي	*haï-haï* (interj.) alas! what a pity!

ي

يابالاق	*yâbalâq* } (subs.) an owl.
ياپالاق	*yâpalâq* }
ياپالاق	*yapalâq* (adj.) flat.
ياپراق	*yapraq* (subs.) a leaf (of a tree), KAZ.
ياپرماق	*yâparmâq*. The same, E. T.
ياپشتورماق	*yap-ish-tur-maq* (v. recip. caus.) to cause to become affixed, to affix.
ياپشماك	*yap-ish-maq* (v. recip.) to stick together, to become affixed to one-another to climb, to "swarm up," [recip. from following].
ياپماق	*yap-maq* (v. tr.) to close, to cover.
يابو	*yâbu* (subs.) a baggage horse or strong pony.
ياپورماق	*yapurmaq*. See ياپرماق.
ياپوشماق	*yap-ush-maq*. See *yapishmaq*.
ياپوغ	*yap-ugh* } (subs.) the covering of a horse, horse-clothing.
ياپوق	*yap-uq* }
ياپونجي	*yap-un-ji* (subs.) a covering (for the body) against rain or cold, a blanket.

یاپونماق *yap-un-maq* (v. refl.) to cover one's self, to throw one's clothes on without putting one's arms into the sleeves.

یاپه‌لاق *yapah-laq.* See یاپالاق.

یات *yât* (adj.) strange, unknown.

یاتاق *yâtâq* (subs.) a man belonging to a nomad tribe who from poverty comes into the towns to earn a livelihood, KAZ, KH.

یاتقاق *yât-qâq* (adj.) sleepy, who sleeps much or often.

یاتقورماق *yât-qur-maq* } (v. caus.) to cause to lie down.
یاتقوزماق *yât-quz-maq* }

یاتلانماق *yât-la-'n-maq* (v. refl.) to feel one's self strange, to be shy.

یاتلاماق *yât-la-maq* (v. tr.) to treat as a stranger, to shun.

یاتماق *yât-maq* (v. intr.) to lie down, to lie.

یاتوغلوق *yât-ugh-luq* (vl. adj.) lying down, leaning.

یاتوق *yât-uq* (vl. adj.) leaning, inclined.

یاد *yâd* (subs.) memory, recollection, P.

یاد داش *yâd-dâsh* for *yâd-dâsht* (subs.) a memorandum, a reminder.

یادلاتماق *yâd-la-'t-mâq* (v. caus.) to cause to remember, to remind, P. T.

یادلاشماق *yâd-la-'sh-mâq* (v. recip.) to remember one another, to speak of one another, P. T.

یادلانماق *yâd-la-'n-maq* (v. pass. or refl.) to be reminded, to bethink one's self, to recollect, P. T.

یادلاماق *yâd-la-mâq* (v. tr.) to commit to memory, to learn by heart.

یار *yâr* (subs.) a friend, P.

یار *yâr* (subs.) a bow (for shooting).

یار *yâr* (subs.) a fissure, a split (in the earth), a bank, a cliff (of earth). [The derivation of the name "Yarkand" is said to be from *yâr* "a bank" and *kand* or *kant* "a village or inhabited place," as in *Besh-kant* "the five villages," Tashkand "the stone abode," &c. Yarkand is situated on the edge of a bank which forms the north-western boundary of a depressed fluviatile plain nearly four miles wide, low and marshy, which was probably formed by the divaricating branches of the Yarkand River. That river, however, now flows in a bed, 7 or 8 miles further east, which resembles in its character the plain on the south-east side of Yarkand. The Zilchak Ustang which runs through the latter some 3½ miles from the city, being derived from the main river some miles higher up, has the appearance of a natural stream and not of a canal, and is perhaps a relic left by the main stream in its former bed. The edge of the higher level plain in the neighbourhood of the city is also cut by numerous fissures or depressions with high banks which add to the appropriateness of the name Yarkand "the city of banks." The name Yamân-yâr "evil banks," is also common in the country, being applied to a river passing south of Kashghar Fort, and also to a dry river-bed some 2 miles north of Yarkand.]

يارا *yara* (subs.) a wound.

ياراتماق *yâr-a-'t-maq* (v. caus.) to cause (or allow) to be pleasant (to one's self), to appreciate, to be pleased with [from *yara-naq*].

ياراتماق *yârât-maq* (v. tr.) to create, to make out of nothing.

ياراتيلماق *yârât-il-maq* (v. pass.) to be created.

ياراش *yâr-âsh* (subs.) peace, concord, P. T.

ياراشتورماق *yâr-â'sh-tur-maq* (v. recip. caus.) to cause to make peace, to reconcile.

ياراشماق *yâr-â'sh-mâq* (v. recip.) to make peace together, to become reconciled; also, to suit, to become, [lit. 'to be pleasant to one-another;' from *yâr-a-maq*].

ياراق *yârâq* (subs.) a weapon, an arm.

ياراقلاماق *yârâq-la-maq* (v. tr.) to arm.

ياراليغ *yara-ligh* } (adj.) wounded.
ياراليق *yara-liq* }

یاراماق	*yâr-a-mâq* (v. intr.) to be pleasant, to be agreeable, to please, P. T.
یاردورماق	*yâr-dur-mâq* (v. caus.) to cause to split, (tr.).
یارغاق	*yârghâq* (subs.) leather (of sheep or goat's skin).
یارغو	*yâr-ghu* (subs.) a fine, an exaction [quasi something split off by force from a man's property] (from *yâr-mâq*).
یارغوچاق	*yâr-ghu-chaq* (subs.) a hand-mill (only used for making tobacco into snuff, or splitting or breaking up grain for cattle, not for flour).
یارقنات	*yâr-qanât* (subs.) a bat.
یارلیغ یارلیق	*yarligh* *yarliq* } (subs.) a (written) decree, an edict, a "farmân."
یارلیق	*yâr-liq* (adj.) friendly.
یارلیق	*yâr-liq* (adj.) fissured, with many banks.
یارلیقاماق	*yârliqa-maq* (v. tr.) to absolve (from sin), to proclaim an amnesty.
یارما	*yâr-ma* (subs.) split peas (or any other grain).
یارماشماق	*yarmash-maq*. Same as *yapish-mâq*.
یارماق	*yâr-mâq* (v. tr.) to split, to slit. [See *yâr* "a fissure."]
یارماق	*yarmâq* (subs.) a bronze coin of small value current in the time of the Chinese.
یاروتماق	*yâru-'t-maq* (v. caus.) to cause to be enlightened, to throw light (or any thing), to lighten, to illuminate.
یاروشماق	*yâr-üsh-mâq* (v. recip.) to split together.
یاروشماق	*yâru-'sh-mâq* (v. recip.) to lighten together.
یاروغ یاروق	*yâr-ugh* *yâr-uq* } (subs.) a split, a crack.
یاروغ یاروق	*yâru-'gh* *yâru-'q* } (subs.) a ray of light, light generally.
یاریلماق	*yâr-il-maq* (v. pass.) to be split.
یاریم	*yar-im* (subs.) half [from *yâr-maq* "to split"].
یاز	*yâz* (subs.) spring, also summer. [See *yâshil.*]
یازدورماق	*yâz-dur-maq* (v. caus.) to cause to write.

يازغورماق	*yâz-ghur-maq* (v. caus.) to cause to err, to cause to be (legally) guilty, to bring in guilty, to convict.
يازلوق	*yâz-luq* (adj.) adapted to summer, summer (clothes, &c.).
يازماق	*yâz-mâq* (v. tr.) to write, [? connected with *yarligh*].
يازماق	*yâz-mâq* (v. intr.) to err, to deviate (from the road or from one's duty).
يازماق	*yâz-maq* (v. tr.) to unfold, to spread out.
يازوق	*yâz-uq* (vl. subs.) an error, a deviation from rectitude, a sin [from *yâz-mâq*].
يازي	*yâzi* (subs.) the country (as opposed to the town) [? from *yâz* summer, quasi "summer quarters," or else from *yâz-mâq* to spread out, quasi "open country," "rase campagne" as opposed to the town].
يازيلماق	*yâz-il-maq* (v. pass.) to be written.
يازيلماق	*yâz-il-maq* (v. pass.) to be spread out.
يازيليق	*yâzi-liq* (subs.) a dweller in the country, a country-man.
ياساتماق	*yasa-'t-maq* (v. caus.) to cause to make.
ياساق	*yâsâ'q* (subs.) line of battle, formation of troops.
ياساماق	*yâsâ-mâq* (v. tr.) to make, to construct, to form, to form up (troops); also, to ornament, to adorn.
ياسانماق	*yâsâ-'n-maq* (v. refl.) to form up in line (of an army); to adorn one's self.
ياساو	*yâsâo* (subs.) a line of battle, Kaz.
ياساول	*yâsâwal* (subs.) a chamberlain, an usher; lit. a former up or arranger of men.
ياستانچاق	*yâstâ-'n-châq* (subs.) an elbow-cushion, a support for the elbows.
ياستانماق	*yâstâ-'n-mâq* (v. refl.) to support one's self on one's elbows, to sit in a half reclining position.
ياستوق	*yâstuq* (subs.) a pillow (for the head), Kaz.
ياسقاق	*yâsqâq* (subs.) a slate [not used for roofing because there is no rain].
ياسموق	*yâsmuq* (subs.) a kind of pulse.

ياسسّي *yâssi* (adj.) wide (in superficial measurement), KAZ.

ياش *yâsh* (subs.) age (counted in years), years of age (*e. g.*, *man qirq yásh-da dur-man* "I am forty years old;" '*besh yásh-gha yelti* "he reached five years of age"].

ياش *yâsh* (adj.) of tender age, young [*e. g.*, *yâsh bala* "an infant," *yâsh yigit* "a young man"].

ياش *yâsh* (subs.) a tear.

ياشار *yâsh-ar* (adj.) aged (so-and-so) [*e. g.*, *ellik yáshar âdam* "a man fifty years of age"].

ياشارتماق *yâsh-ar-'t-mâq* (v. caus.) to cause to weep.

ياشارتماك *yâsh-ar-'t-mâk* (v. caus.) to cause to become green.

ياشارماق *yâsh-ar-mâq* (v. intr.) to weep, to shed tears.

ياشارماك *yâsh-ar-mak* (v. intr.) to sprout, to become green.

ياشاماق *yâsh-a-mâq* (v. intr.) to age, to grow older [applies equally at all ages].

ياشانماق *yâsh-an-mâq* (v. refl.) to age one's self, to grow older.

ياشلوق *yâsh-luq* (subs.) youth, early age.

ياشورماق *yâsh-ur-maq* (v. caus.) to cause to be hidden, to hide, to conceal.

ياشورون *yâsh-ur-un* (adj.) hidden, concealed.

ياشورونماق *yâsh-ur-un-mâq* (v. refl.) to hide one's self, to conceal itself.

ياشونماق *yâsh-un-mâq* (v. refl.) to hide one's self.

ياشيق *yâshiq* (adj.) lean, without fat (said only of meat).

ياشيل *yâshil* (adj.) green. [Possibly this is a passive form derived from a root having the meaning of 'becoming green' as connected with the growth of plants, and which would be the common origin of *yâsh* 'early age', 'budding youth,' and of *yâsh-ar-mak* "to become green," (whose form shows that the syllable *il* in *yâshil* is not of the essence of the root), *ar* being the verbal co-efficient of colour, as *kok-ar-mak* "to become blue," *sarigh-ar-maq* "to become yellow," *özga-'r-mak* "to become of different colour." See also *qiz-ar-mak* and *qizil*. This hypothetical common root of *yâsh* and *yâsh-il* is perhaps connected with that of *yâz* "spring" (the season of growth). Compare also *yàz-màq* "to open out." Prof. Vambery (from the *kudatku Bilik)* gives the following comparison of the ages of man with the seasons of the year.

yâz = Spring, answers to childhood (which we have seen is called *yâsh*).

yaï = Summer, answers to youth.

kös (kuz) = Autumn (the reaping season), answers to full-grown manhood.

qish = Winter, answers to old age.

Thus it appears (as might indeed be imagined) that the idea of comparing man's childhood with the season of the first growth of plants has long been familiar to the Turks, and they may have expressed this in the formation of their words for the same.]

ياشين *yâshin* (subs.) lightning.

ياغ *yâgh* (subs.) grease, fat. [Distinguished into *su-yâghi* "oil," *tatliq yâgh* "sweet oil," *quyuruq yàghi* lit. "tail fat" (the fat of the tail of the Dumba sheep), *sarigh yàgh* "yellow grease," *viz.*, "ghee or clarified butter," *maskah yàgh* "butter."]

ياغاچ *yaghâch* (subs.) wood, a stick.

ياغدورماق *yagh-dur-maq* (v. caus.) to cause to rain, to water (from above), "*arroser.*"

ياغرون *yaghrün* (subs.) a shoulder-blade, KAZ. KIRGH.

ياغرونچي *yaghrün-chi* (subs.) one who divines by means of the shoulder-blades of sheep, KAZ. KIRGH.

ياغلاغو *yâgh-la-ghu* (subs.) a frying-pan, [from *yâgh* 'grease'].

ايغلانماق *yâgh-la-'n-mâq* (v. pass. and refl.) to be made or become greasy, to make itself greasy, to become greasy of itself.

ياغلاماق *yâgh-la-mâq* (v. tr.) to make greasy, to grease.

ياغليق *yâgh-liq* (subs.) a napkin (for wiping the grease from one's hands); also, (adj.) greasy.

ياغي *yâghi* (adj.) rebellious; also, warring, at war, P.

باغير *yâghir* (adj.) galled (by the saddle, &c., said of a horse).

ياغيليق *yâghi-liq* (subs.) rebellion ; also, hostility, P. T.

ياغين *yaghin* (subs.) rain.

ياق *yak* (subs.) the jaw-bone.

ياقا *yâqâ* (subs.) a border, an edge, a collar (of a garment), [the other edges of a garment have a different name].

ياقالاماق *yâqâ-la-maq* (v. tr.) to border, to edge ; to move along the edge (of anything) ; to make a collar (to a garment) ; to seize by the collar, to collar.

ياقتورماق *yâq-tur-maq* (v. caus.) to cause to light (fire).

ياقتورماق *yâq-tur-maq* (v. caus.) to cause (or allow) to be pleasant (to one's self), to approve, to be pleased with.

ياقتي *yâqti* (subs.) light, Kaz.

ياقماق *yâq-mâq* (v. tr.) to light, to set on fire.

ياقماق *yâq-mâq* (v. intr.) to be agreeable, to please [governs *gha*].

ياقين *yâq-in* (adv.) near, close to [? at the edge *(yâqa)*].

ياقيلماق *yâq-il-maq* (v. pass.) to be lighted.

ياقينلاماق *yâqin-la-maq* (v. intr.) to become near, to approach [governs *gha*].

يال *yâl* (subs.) a mane (of a horse).

يال *yâl* (subs.) wages, pay, recompense for service.

يالاق *yâlâq* (subs.) a plate for feeding dogs out of, [from their licking up the remainders].

يالاماق *yâla-mâk* (v. tr.) to lick.

يالانغاچ *yalânghâch* (adj.) naked, bare [? from *yala-maq*].

يالانغاچلاماق *yalanghâch-la-maq* (v. tr.) to make naked, to strip.

يالانگ *yâlang* (adj.) half-clothed (said of a man insufficiently clothed in cold weather), bare, naked (said of a plain or mountain).

يالانگلاماق *yâlang-la-mâq* (v. tr.) to make bare ; also, to brandish [(a sword).

يالانگليق *yâlang-liq* (subs.) a bare place, an open plain.

يالاو *yâlao* (subs.). See *yâlâq*, Kaz.

يالبارماق *yalbâr-mâq* (v. intr.) to beseech, to entreat, to act as a 'lick spittle' [? from *yâla maq*].

یالپاق	*yâlpâq* (adj.) wide (in superficial measurement), flat.
یالتوراتماق	*yâl-tur-a't-mâq* (v. caus.) to cause to glisten (whether by rubbing up to make bright, or by displaying the bright object in the light).
یالتوراماق	*yâl-tur-a-mâq* (v. intr.) to glisten, to shine.
یالچیتماق	*yâl-chi-'t-maq* (v. caus.) to cause to be pleased with one's service, to render acceptable service.
یالچیماق	*yâl-chi-mâq* (v. intr.) to be pleased with (any one's) services, to approve. [Governs '*din*'.]
یالدیراماق	*yâl-dir-a-mâq*. See *yalturamâq*.
یالغاماق	*yâlgha-mâq* (v. tr.) to join, to unite.
یالغان	*yalghân* (subs.) a lie, an untruth.
یالغانچی	*yalghân-chi* (subs.) a liar.
یالغوز	*yalghoz* (adj.) alone.
یالغوزلیق	*yalghoz-liq* (subs.) loneliness, the being alone.
یالغوزلاماق	*yâlghoz-la-maq* (v. tr.) to isolate, to cause to be alone.
یالغوزلوق	*yâlghoz-luq* (subs.) solitude, loneliness, isolation.
یالین	*yâlin* (subs.) a flame.
یالیندورماق	*yâlin-dur-mâq* (v. caus.) to cause to entreat (by withholding what is asked for), '*se faire prier.*'
یالینماق	*yâlin-maq* (v. intr.) to beseech, to abase one's self in entreaties (governs *gha* of the person entreated, and *uchun* of the petition) [? the refl. form of *yâla-maq ;* see also *yâbarmâq*.]
یاماق	*yâ'mâq* (vl. subs.) a patch (sewn into a garment).
یاماماق	*yâma-mâq* (v. tr.) to patch, to sew a patch over a rent in a garment.
یامان	*yamân* (adj.) bad, evil ; also, bad to beat, brave, adroit.
یامانلاماق	*yamân-la-mâq* (v. intr.) to become bad, to take in bad part, to take it ill, to be offended ; also, to die of a certain disease (of horses in which the breast swells).
یامانلیق	*yamân-liq* (subs.) evil, badness.
یامغور	*yâmghur* (subs.) rain.

یان *yân* (subs.) a flank, a side. [Forms several adverbs, see Grammar.]

یانا *yâna* (adv.). See *yanah.*

یانباش *yân-bâsh* (subs.) the hip-bone [lit. 'side-head'].

یانباشلاماق *yân-bâsh-la-mâq* (v. intr.) to lie on one's side, to recline on one's hip.

یانتاق *yântâq* (subs.) a thorny plant growing in desert places and eaten by camels.

یانجیتماك *yânji't-mâq* (v. caus.) to cause to pound up.

یانجیماك *yânji-mâq* (v. tr.) to pound up, to reduce to powder; also, (metaph.) to bring to nothing, to ruin.

یانچیق *yân-chiq* (subs.) a side-pocket.

یانداش *yân-dâsh* (subs.) a companion, lit. "a side-fellow" [conf. *qursâq-dâsh*].

یانداشماق *yân-dâsh-mâq* (v. intr.) to accompany, to be or go side by side.

یاندورماق *yân-dur-maq* (v. caus.) to cause to burn, to burn (tr.).

یاندورماق *yân-dur-mâq* (v. caus.) to cause to return, to return (tr.); also, to cause to do again.

یانگاق *yangâq* (subs.) a walnut.

یانگاق *yângâq* (subs.) the jaw-bone.

یانگراماق *yangra-mâq* (v. intr.) to echo back, to give an echo.

یانگغاق *yangghâq* (subs.) a walnut.

یانگلماق *yangil-maq* (v. tr.) to make a mistake.

یانگزه *yangzah* (subs.) sort, kind, pattern, CHIN.

یانگلیغ *yang-ligh* (adj.) equal, same [generally used with *bir* before it, = one and the same] (obsolete).

یانگلیش *yangl-ish* (vl. subs.) a mistake [from *yangilmaq*].

یانماق *yân-maq* (v. intr.) to burn, to consume (itself) by fire.

یانماق *yân-mâq* (v. intr.) to return, to turn back; also, to change one's mind, to give up [governs *din*]; also, its past participle in composition with another verb indicates repetition of the action of the latter, *e. g.*, *yân-ip qel-dim* "I did it over again."

يانيماق	*yâni-mâq* (v. tr.) to whet, to sharpen, '*repasser*.'
ياو	*yâo* (subs. and adj.) an enemy ; also, hostile, Kaz.
ياوا	*yâwa* (adj.) wild, not tamed.
ياواش	*yawash* (adj.) tame, docile, tractable.
ياوچي	*yâu-chi* (subs.) a go-between, or arranger of a marriage [the custom is for this person to wear one leg of his trousers loose over his riding boot while the other leg is tucked into the boot as usual ; this is the mark of the business that he has come upon] (? from *yâu-maq*).
ياوشماق	*yâu-'sh-maq* (v. recip.) to approach one another, to approach together [from *yâu-maq*].
ياوق	*yâu-'q* (adv.) near.
ياوقلاماق	*yâu-'q-la-mâq* (v. intr.) to approach.
ياوماق	*yâu-maq* (v. intr.) to approach.
ياي	*yâi* (subs.) summer, [rare at the present day except in camp].
ياياق	*yâyâq* (subs.) a footman ; also, (adv.) on foot, Kh.
يایاو	*yayâo*. The same, Kaz.
يايلاق	*yaï-lâq* (subs.) a summer pasture, an 'alp' (in the Swiss sense).
يايلاماق	*yâi-la-maq* (v. intr.) to pass the summer (used of flocks and herds taken to their summer-pastures).
يايماق	*yâï-mâq* (v. tr.) to spread out, to extend. Same as *yâz-maq*.
يايولماق	*yây-ul-mâq* (v. pass.) to be spread out, to flood.
يتّايلان	*yett'-âïlan* (num. subs.) a group of seven.
يتمش	*yet-mish* (num.) seventy.
يتمشنچي	*yet-mish-anchi* (n. adj.) seventieth.
يتنچي	*yet-'anchi* (num. adj.) seventh.
يتّي	*yetti* (num.) seven [*yetti-yulduz* or *yetti-ughri* ('the seven stars' or 'the seven thieves'), the name of the Great Bear among the Kazzaks, who say that this constellation is a gang of robbers ever circling round to watch their opportunity of carrying off the two horses (two

bright stars of Ursa Minor) called *Aqbôz ât* and *Kök-bôz ât* ('white-grey horse' and 'blue grey horse') which are picketted to a peg (the Pole-Star) round which they graze].

یخ *yakh* (subs.) ice, P.

یختان *yakh-tan* (subs.) a pannier, a leather box forming one side of a baggage animal's load, [for P. *yak-dân*].

یخشي *yakhshi* (adj. and adv.) good; well.

یخک *yakhak* (subs.) glazed chintz [? from *yakh*, ice, P.].

یخلاماك *yakh-la-mak* (v. intr.) to freeze; also, to set (of grease or any liquid or viscous fluid which hardens with decrease of temperature), P. T.

یخني *yakhni* (subs.) cold meat.

ید *yed* (subs.) a perfume, a pleasant smell. [smell.

یدلاتماك *yed-la-'t-mak* (v. caus.) to cause to perceive a pleasant

یدلاماك *yed-la-mak* (v. tr.) to smell, to perceive a pleasant odour.

یدلانماك *yed-la-'n-mak* (v. pass. and refl.) to be smelt, to smell (intr.) to give rise to a pleasant odour.

یدلیک *yed-lik* (adj.) pleasant smelling, odoriferous.

یَرا *yarâ* (subs.) a wound.

یَراغ *yarâgh* (subs.) a weapon, an arm, [see یاراق].

یراغلاماق *yaragh-la-maq* (v. tr.) to arm. Same as یاراقلاماق.

یراغلیق *yarâ-'gh-liq* (vl. adj.) pleasing [from *yarâ-maq*].

یراغلیق *yarâgh-liq* (adj.) armed.

یُراق *yurâq* (adj.) distant; also, (adv.) far.

یُراقلاشماق *yurâq-la-'sh-maq* (v. recip.) to remove to a distance from one another, to separate (tr. or intr.).

یُراقلاماق *yurâq-la-maq* (v. tr.) to remove to a distance.

یُراقلیق *yurâq-liq* (subs.) distance, far-ness.

یراماق *yara-maq*. See یاراماق.

یغاچ *yzghâch* (subs.) wood.

یغاچچي *yaghâch-chi* (subs.) a carpenter.

یغلاماق *yighla-màq* (v. intr.) to weep, to lament with tears.

يغي *yighi* (subs.) weeping, lamentation.

يقا *yeqa.* See ياقا.

يقتماق *yek-it-mâq* (v. caus.) to cause to fall, to throw down.

يقلماق *yek-il-mâq* (v. pass.) to be caused to fall, to be thrown down, to fall.

يقماق *yek-mâq* (v. tr.) to throw down, KAZ.

يكه *yak-kah* (adj. and adv.) alone ; only, P.

يگرماك *yigar-mak* (v. tr.) to spin. [Also ايگرماك]

يگرمايلان *yigarm-aïlan* (num. subs.) a group of twenty.

يگرمنچي *yigarm'-anchi* (num. adj.) twentieth.

يگرمه *yigarmah* (num.) twenty.

يل *yil* (subs.) a year. [The solar year from *nâo-roz* to *nâo-roz* (early spring) is called after the animals of the Tartar year-cycle. The lunar year is of course called by its number after the era of the Hijra.]

يلان *yulân* (subs.) a serpent, a snake.

يلانگ *yalâng.* See يالانگ.

يلانگغاچ *yalâng-ghâch.* See يالانغاچ.

يلقي *yulqi* (subs.) horse-kind (used of horses generally without distinction of sex or age, like the English word 'mankind' for the children of men generally), *bir top yulqi* "a (mixed) herd of horses."

يُلقي چي *yulqi-chi* (subs.) a keeper of a herd of horses.

يليق *yiliq* (adj.) lukewarm, tepid.

يليک *yilik* (subs.) marrow. Also ايليق.

يملاماك *yem-la-mak* (v. tr.) to paste, to glue. Also ييليملاماك.

ينگا *yanga* (subs.) an elder brother's wife.

ينگليغ *yang-ligh.* See يانگليغ.

ينگي *yangi* (adj.) new.

ينه *yanah* (adj. and adv.) other ; also, again.

يوا *yuâ* (subs.) a leek.

يواتماق *yuâ-'t-maq* (v. caus.) to cause (a child) to stop crying (by giving it something to amuse it), to hush.

یواش *yuá'sh* or *yawá-'sh* (adj.) mild, tractable, gentle.

یواشلیق *yuásh-liq* (adj.) mildness, gentleness.

یوالدوز *yuâlduz* (subs.) a packing-needle.

یواندورماق *yuá-'n-dur-maq* (v. caus.) to cause (a child) to stop crying, to pacify, to soothe (a child).

یوانماق *yuâ-'n-maq* (v. refl.) to pacify itself, to stop crying (of a child), to become hushed.

یوپقا *yupqa* (adj.) thin (not used of men or animals).

یوپقالاماق *yupqa-la-maq* (v. tr.) to make thin.

یوپوغ *yupugh.* }
یوپوق *yupuq.* } See یاپوغ.

یوت *yut* (subs.) a scarcity of grass on the pastures.

یوتال *yütal* (adj.) coughing, having a cough.

یوتالماك *yütal-mak* }
یوتكورماك *yüt-kür-mak* } (v. intr.) to cough.

یوتورماك *yüt-ür-mak* (v. caus.) to cause to be lost, to lose [for یتورماک].

یوتماق *yut-maq* (v. tr.) to swallow.

یورا *yurá* (adv.) upright, standing, KAZ.

یوراك *yurak* (subs.) heart (used without metaphor).

یورت *yürt* (subs.) a country, one's home.

یورتاول *yurt-aul* (subs.) a mounted troop of plunderers [from *yurt-maq*].

یورتاك *yurt-ak* (vl. subs. and adj.) a trot; trotting.

یورتقاق *yurt-qan* (subs.) a counterpane, a bed-covering stuffed with cotton.

یورتماق *yurt-máq* (v. intr.) to trot.

یوردورماك *yür-dür-mak* (v. caus.) to cause to proceed [from *yür-mak*].

یورغا *yurgha* (subs.) an amble (pace of a horse).

یورغالاماق *yurgha-la-maq* (v. intr.) to amble.

یورگاماك *yurga-mak* (v. tr.) to roll up, to wind, to fold.

یورگانماک *yurga-'n-mak* (v. refl.) to roll one's self up.

یورگوزماك *yür-güz-mak.* See *yür-dür-mak.*

یورما *yurma* (subs.) an ornamental stitch worked with a crochet by means of which loops of thread are brought through the stuff from behind, each loop being brought through the bight of the preceding one.

یورماق *yûru-mâq* (v. tr.) to interpret (a dream).

یورماک *yûr-mâq* (v. intr.) to walk, to progress, to proceed, [*ât-ga min-ip yür-mak* "to proceed on horseback"].

یوروتماک *yürü-'t-mak* (v. caus.) to cause to walk, to cause to proceed.

یوروماک *yürü-mak*. See *yür-mak*, also *mang-mâq*.

یوروق *yûrûq*. See *yâruyh*, *yâruq* (in both senses).

یوروک *yürü-'k* (vl. subs.) pace, gait, manner of walking.

یوز *yüz* (subs.) the cheek, the face; also, face or surface (of any object); also metaph., *an-din ul yüz-i ghâ* that side of it (*viz.*, beyond it); *fulân kelgan-ning bu-yüz-i-da* "since so-and-so came" (lit. "on this side of so-and-so's coming"). *Bu* (or *ul*)*-yüz-i da* (or *gha*) is thus a compound post-position taking *ning* or *din* after the noun. [See grammar.]

یوز *yüz* (num.) a hundred.

یوزاو *yüz-âo* (num. subs.) a group of a hundred, KAZ.

یوزایلان *yüz-aïlan* (num. subs.) a group of a hundred, 'une centaine.'

یوزباشي *yüz-bâshi* (subs.) a chief of a hundred, a centurion.

یوزلاتماك *yüz-la-'t-mak* (v. caus.) to cause to put face to face, or confront; also, to cause to face round (tr.)

یوزلاشتورماك *yüz-la-'sh-tur-mak* (v. recip. caus.) to cause to face or confront one another.

یوزلاشماک *yüz-la-'sh-maq* (v. recip.) to face or confront one another.

یوزلاماک *yüz-la-mak* (v. tr.) to put in face of, to confront (tr.); also, to face round (a man or any object, &c.).

یوزلاماک *yüz-la-mak* (v. tr.) to bring up to the number of hundred.

یوزلانماک *yüz-la-'n-mak* (v. refl. and pass.) to face, to put one's self in face of ; also, to face (one's self) round, to turn one's face towards ; also, to be confronted, to be faced round.

یوسون *yusun* (subs.) institution, regulation, custom. [? from *yâsâ-mâq* for *yâsun*].

یوسونلوق *yusun-luq* (adj.) regular, customary.

یوشورماق *yushur-maq*. See *yâhsur-maq*.

یوشورون *yushur-un*. See *yâhsurun*.

یوشه *yoshah* (subs.) a kind of red earth used as a colouring matter.

یوغ *yogh* (subs.) a yoke, P.

یوغ *yogh* (subs.) the axle of a water-wheel, whose prolongation forms also the axle of the upper mill-stone (revolving through a hole in the centre of the lower mill-stone), KH.

یوغان *yoghan* (adj.) thick, stout, fat ; also, large, big.

یوغانلاماق *yoghan-la-maq* (v. tr.) to make thick, to thicken.

یوغانلانماق *yoghan-la-'n-maq* (v. refl. and pass.) to become thick or stout ; to be made thick, &c.

یوغانلیق *yoghan-liq* (subs.) thickness, stoutness.

یوغوچی *yu-ghu-chi* (subs.) a washer, specially a washer of the dead.

یوغورماق *yughur-mâq* (v. tr.) to mix, to compound (any substance with a liquid).

یوق *yoq* (v. impers.) is not, there is not, not being, non-existent, non-existence, &c. ; also (interj.) no ! [never used with a verb, like our word 'not,' to give it a negative sense ; the seeming exceptions being resolvable into compound tenses in which *yoq* is used as the Participle of the verb of negation prefixed to an auxiliary verb : *e. g.*, *yoq-dur-man*, *yoq-idim* (compare *qelghan-dur-man*, *qelghan-idim*) but never *yoq bir-dim* or *yoq bira-man* (not auxiliaries). Instead of these we always have the forms *bir-ma-dim*, *bir-maï-man* ("I gave not," "I give not"). Again *yoq-qelmâq* means "to make non-existent," "to destroy", "to annihilate"! (it is not the negative of "to make," which would be *qel-mas*, but a compound verb). Here *yoq* is used as a verbal adjective (compare *chung qelmâq* "to make big"). *Yoq-bolmâq* = "to become non-existent", "to be destroyed or annihilated", ("not to become ..." would be *bol-mas*)]. Misc. Ex. *ish-im yoq-qa ketti* "my work came (went) to nothing;" *man yoq waqt-da* "at a time when I was not present", (lit. "I-not-being time in"); *man-da yoq* "I have not ..." (lit. 'there is not to me'). Finally wherever *bâr* is used, *yoq* can be substituted for it, if it be desired to make the statement negative.

يوقا *yuqa*. See *yupqa*, KAZ.

يوقاري *yoqari* (adv. and post-pos.) up, above; also, above, over. [See Grāmmar].

يوقاريلاش *yoqari-lash* (adj. and adv.) sloping upwards; upwards by a slope.

يوقاتماق *yoq-at-maq* (v. tr.) to make non-existent, to annihilate, to destroy; also, to lose, [for *yoq itmak*].

يوقالماق *yoq-al-maq* (v. intr. and passive) to become non-existent, to be destroyed or annihilated, to disappear; also, to be lost, [for *yoq-bolmâq*].

يوقتورماق *yuq-tur-maq* (v. caus.) to cause to be inflected, to inflect, (tr.), [with the particular illness as a nominative or subject, and *din* (from) and *gha* (to) of the persons].

يوقسو *yoq-so* (interj.) a respectful form of *yoq*.

يوقسوز *yuq-süz* (adj.) of no account, mean, miserly.

يوقسوز *yû-uq-süz* (adj.) unwashed, dirty [from *yû-mâq*].

يوقلاماق *yoq-la-maq* (v. tr.) to remember.

يوقماق *yuq-maq* (v. intr.) to stain, to leave a mark, to touch, to affect, to produce an effect, to profit; to infect, to attack (as does an illness) [governs *gha*].

يوك	*yük* (subs.) baggage, a load, goods.
يوگان	*yugan* (subs) a bridle.
يوكلاماك	*yük-la-mak* (v. tr.) to load, to lade (with accusative of the object and *gha* of the carrier).
يوكلوك	*yük-lük* (vl. adj.) laden.
يوگورماك	*yügür-maq* (v. intr.) to run.
يوكوندورماك	*yükün-dür-mak* (v. caus.) to cause to sit in a kneeling position.
يوكونماک	*yükün-mak* (v. intr.) to sit in a kneeling position [the universal ceremonious mode of sitting in Central Asia, first kneeling down and then sitting back on one's heels; the mode of sitting with the legs crossed in front of one (tailor-fashion) which is called *chár zánu* ('four knees'), is considered either familiar or disrespectful.]
يول	*yol* (subs.) a road, a route, a way; also the E. Turkistani name for the Chinese unit of road-measurement, a "*li*" [defined to be the distance at which the horns on a cow's head or the distinction between a man and a woman's face become indistinguishable !].
يولاماق	*yola-máq* (v. intr.) to approach, to go near, [see *yán-maq* and *yauq-la-maq*].
يولاماک	*yula-mak* (v. tr.) to prop, to support, to shore up.
يولانماک	*yula-'n-mak* (v. refl.) to support one's self, to lean.
يولبارس	*yulbars* (subs.) a tiger.
يولداش	*yol-dash* (subs.) a companion on the road, a travelling companion.
يولدورماق	*yul-dur-maq* (v. caus.) to cause to pull up by the roots.
يولدوز	*yüldüz* (subs.) a star (including planets); *quyuruq yulduz* "a comet" (lit. 'a tail-star').
يولغون	*yülghun* (subs.) tamarisk.
يوللاماق	*yol-la-máq* (v. tr.) to set (a man) on his way, to start (any one).

يولماق *yul-maq* (v. tr.) to uproot, to pull out by the roots.

يولون *yulun* (subs.) the spinal chord.

يولوقماق *yol-uq-mâq* (v. intr.) to meet by the way, to encounter, [governs *gha*].

يوماق *yû-mâq* (v. tr.) to wash.

يوماق سبت *yumâq-sibit* (subs.) the fruit of the *Coriandrum Sativum*, 'Dhania' Hind.

يومالاتماق *yumala-'t-maq* (v. caus.) to cause to roll about, to roll about (tr.).

يومالاماق *yumala-maq* (v. intr.) to roll about.

يومالاق *yumala-'q* (vl. adj.) round, spherical.

يومالاقلاماق *yumalaq-la-maq* (v. tr.) to make round.

يومرتقه *yumurtkah* (subs.) an egg, KAZ.

يومشاق *yumshâq* (adj.) soft.

يومغاق *yumghâq* (subs.) a ball of thread, &c.

يومماق *yum-maq* (v. tr.) to close (one's eyes, mouth or hand).

يوموق *yum-uq* (vl. adj.) closed (of the eyes, mouth or hand).

يومورماق *yumur-mâq* (v. caus.) to throw down, to overthrow (a wall or building).

يوموروق *yumur-uq* (vl. adj.) ruinous, in a ruinous condition.

يون *yun* (subs.) wool, KAZ. KH.

يونگ *yung* (subs.) wool.

يونگچقه *yungichqa* (subs.) lucerne (the grass), KAZ., KH.

يونگول *yungul* (adj.) light (not heavy).

يونماق *yun-mâq* (v. tr.) to cut (in a shaving manner, as a pen), to whittle.

يونماق *yû-un-mâq* (v. refl.) to wash one's self.

يونوچقه *yunuchqah* (subs.). See *yungichqa.*

يونوچكه *yunuchkah* (adj.) fine, slender.

يونوماق *yunu-mâq*. See *yâni-mâq.*

يووق *yûuq*. See *yâuq.*

يووقلاماق *yûuq-la-mâq*. See *yâuq-la-maq.*

ييپ *yip* (subs.) thread. See *jib.*

ییپلیک *yip-lik* (subs.) a fine thread attached by leather-workers to the thicker thread with which their stitches are made, which fine thread is pushed through by means of a needle drawing the stouter thread with it.

ییپاك *yipak* (subs.) silk.

ییتّیک *yittik* (adj.) sharp, acute.

ییتّماك *yet-mak* (v. intr.) to arrive, to reach, to attain.

ییتّمیش *yet-mish* (num.) seventy. See یتمش.

ییتّي *yetti* (num.) seven. See یتي.

ییر *yèr* (subs.) ground, land, the earth; also, place, locality.

ییراق *yeraq* (adj. and adv.) distant, far.

ییرلاماك *yer-la-mak* (v. tr.) to put into the earth, to bury.

ییشماك *yesh-mak* (v. tr.) to untie, to undo a knot.

ییشنماك *yesh-in-mak* (v. refl.) to untie one's self, to undress one's self.

ییغماق *yigh-mâq* (v. tr.) to collect, to bring together, to accumulate.

ییغین *yigh-in* (subs.) an assemblage.

ییغینماق *yigh-in-maq* (v. refl.) to collect themselves, to assemble; also, to collect one's self, to tuck in one's skirts (in sitting down).

ییکان *yékan* (subs) a water-rush.

ییگیت *yigit* (subs.) a young man; also, a soldier (cavalry).

ییگرماك *yigar-mak.* See یگرماك.

ییگرمه *yigarmah.* See یگرمه.

ییل *yil.* See یل.

ییل *yil* (subs.) wind, Kaz.

ییلان *yilán.* See یلان.

ییلپوگوچ *yel-pu-gu-'ch* (subs.) a fan.

ییلپیماك *yel-pi-mak* (v. tr.) to fan.

ییلدام *yil-dam* (adv.) quickly, fast.

ییتّدیز *yildiz* (subs.) a root-filament.

ییلیم *yelim* (subs.) glue.

ییلیملاماك *yelim-la-mak* (v. tr.) to glue.

ییم *yem* (subs.) corn, cattle-feed.

ییماک	*yé-mak*	(v. tr.) to eat.
ییملاماك	*yem-la-mak.*	See ییلیملاماك.
ییمیش	*yé-mish*	(subs.) fruit.
ییڼگ	*ying*	(subs.) a sleeve.
ییڼگیل	*yengil*	(adj.) light (not heavy).
ییڼیک	*yenek*	

APPENDIX

TO

VOCABULARY.

TURKI NAMES OF BIRDS.

By J. Scully, Esq.

Late Medical Officer, Kàshghar Agency.

اچچه قویروق سا	Achchah qoyruq sá. The Common Kite of Eastern Turkistan, *Milvus melanotis*.
اق اوقار	Aq áuqár. The White Heron, *Herodias alba*.
اق باش سا	Aq bash sá. The Marsh Harrier, *Circus æruginosus*.
اق قوچقاچ	Aq quchqách. The Tree Sparrow, *Passer montanus*.
الاباش کورك اوردا‌ك	Alá básh kurak aurdák. The Common Teal, *Querquedula crecca*.
الاچیکیت	Alá chikit. The Black-throated Wheatear, *Saxicola deserti*.
الا سوقان	Alá soqán. The White Stork, *Ciconia alba*.
الا غاز اورداك	Alá gház aurdák. The Merganser, *Mergus castor*.
الا غورالاي	Alá ghurálái. The Grey Shrike, *Lanius Homeyeri*.
الا قارغه	Alá qárgha. The Hooded Crow, *Corvus cornix*.
اورداک	Aurdák. Equivalent to our word 'duck', but applied specially to the Mallard, *Anas boschas*.
اوقار	Auqár. The Grey Heron, *Ardea cinerea*. See عقار.
اولار	Aulár. The name given to two species of Snow-cocks or Snow-pheasants, *viz*., *Tetraogallus himalayensis* and *Tetraogallus tibetanus*.
اوي قارلوغاچ	Ui qárloghách. The Common Swallow, *Hirundo rustica*.

اياغ سيز	Ayágh siz. The name given to a Night-jar or Goatsucker, *Caprimulgus arenicolor.*
ايتالگو	Aitalgu. The female of the ' Shunqár, *Falco Hendersoni.*
ايساك	Aisák. Name of a bird about the size of a Thrush.
ايله تورغاي	Ili torghai. The Bokhara Lark, *Melanocorypha torquata.*
باليقچي	Báliqchi. The name of the Common and Lesser Terns, *Sterna fluviatilis* and *Sternula minuta.*
باي قوش	Bái qush. The Snowy Owl, *Nyctea nivea.*
بحري	(A.) Baḥri. The Peregrine Falcon, *Falco peregrinus.*
برتوغرام	Bir toghrám. A small Wren, *Troglodytes pallidus.*
برگوت	Birgut or بورگوت Burgut. The Golden Eagle, *Aquila chrysaetus.* See قراقوش
بوظ اورداك	Boz aurdák. The Smew, *Mergellus albellus.*
بوظ چيكيت	Boz chikit. The Wheatear, *Saxicola isabellina.*
بوظ سا	Boz sá. The Pale Harrier, *Circus Swainsonii.*
بوظ سوندوك	Boz sunduk. The Water Pipit, *Anthus aquaticus.*
بوظ غورالاي	Boz ghurálái. The Desert Shrike, *Lanius arenarius.*
بوظ لاچين	Boz láchin. The name of a Falcon, *Falco Tscherniaïevi.*
بغيتاق	Baghitáq. The Large Sand Grouse, *Pterocles arenarius.*
بلبل	Bulbul. The Barred Warbler, *Nisoria undata.* [و توالاق.
بيدنه	Baidina. The Common Quail, *Coturnix communis.* See
پاختک	Pákhtaq; cf. فاخ ته Pers. The Kashghar Ring-Dove, *Turtur Stoliczkæ.*
پوپشک تورغاي	Popshak torghai. The Crested Lark, *Galerita magna.*
پور باش	Pur bash. The Mountain Finch, *Montifringilla hæmatopygia.*
پور تومشوق قارغه	Pur tumshuk qárgha. The Rook, *Corvus frugilegus.*
تاغ تومچوق	Tágh tumuchuq. Swinhoe's Finch, *Carpodacus mongolicus.*
تاغ قارغاسي	Tágh qárghási. The Alpine Chough, *Pyrrhocorax alpinus.*

تاغ قارلوغاچ	Tagh qárlogháeh. The Crag Martin, *Ptionoprogne rupestris.*
تاغ قوچقاچي	Tagh quchqáchi. The name given to several species of passerine birds found only in the mountains.
تاغ هوپوپي	Tagh hupupi. The Bohemian Waxwing, *Ampelis garrula.*
تراچي	Taráchi. The Willow Sparrow, *Passer salicicolus.*
توخوناک قارغه	Tukhunák kárgha. The Jackdaw, *Colæus monedula.*
توخي	Tokhi. A Fowl. See قومتوخي.
توز	Toz. The Pea-fowl, *Pavo cristatus.*
تورغاي	Torghai. A Lark.
تورولغو	Torulghu. The Turtle Dove, *Turtur auritus.*
تورومطاي	Turumtai. The Merlin, *Lithofalco æsalon.* In India this name is applied to a different species, *viz., Hypotiorchis chicquera,* the Red-headed Merlin.
توخمک سا	Tokhmak sá. The Long-legged Buzzard, *Buteo ferox.*
توغراق قوچقاچي	Toghraq quchqáchi. A Rose Finch, *Propasser* ——.
توموچوق	Tumochuq. The name given to a species of Finch, *Erythrospiza obsoleta.*
جغلباي	Jaghalbai. The Hobby, *Hypotriorchis subbuteo.*
جنگ جنگ	Jing jing. The Bearded Reedling, *Calamophilus biarmicus.*
جنگسا	Jingsa. The Indian Bush-chat, *Pratincola indica.*
جيگدا چوک	Jigda chuk. The Black-throated Thrush, *Planesticus atrogularis.*
چاسغسواورداك	Cha sughsu aurdák. The Pintail Duck, *Dafila acuta.*
چاغچي	Chaghchi. The Indian Blue Throat, *Cyanecula suecica.*
چا قوچقاچ	Cha quchqách. The name of a Bunting, *Emberiza schœnicola.*
چغونداك	Chaghundák. The Bactrian Owlet, *Athene bactriana.*
چمن	Chaman. The Lapwing, *Vanellus cristatus.*
چولانتورغاي	Chulán torghái. A small Lark, *Alandula pispoletta.*

چوللوق	Chulloq. A name applied to several species of Plover.
چومغاق	Chumigháq. The Little Grebe, *Podiceps minor.*
چيغچي	Chighchi. A species of Reed Warbler, *Acrocephalus macrorhynchus.*
چيكيت	Chikit. A Wheatear, *Saxicola.*
چيكيت قنات اورداك	Chikit qanát aurdak. The White-eyed Duck, *Aythya nyroca.*
خرونه	Kharuna. The Water Hen, *Gallinula chloropus.* See قودن.
زاغچه	Zaghcha. The Andijani name for the Jackdaw. See توخوناك قارغه.
زرغلداق	Zarghaldáq. The Andijani name for the Golden Oriole. See سوپيا.
زغاراق	Zagháráq. The Green Sandpiper, *Actitis ochrophus.*
زونگاق	Zungáq. *Podoces humilis.*
سا	Sá. The name given to Buzzards, Harriers and Kites.
ساچ	Sách. The Rose-coloured Starling, *Pastor roseus.*
سالوار	Sálwár. The Cinereous Vulture, *Vultur monachus.*
سريغ سوندوک	Sarigh sunduk. The Yellow-headed Wagtail, *Budytes citreola.*
سريغ قوچقاچ	Sarigh quchqách. The Red-headed Bunting, *Euspiza luteola.*
سغزغان	Saghizghán. The White-rumped Magpie, *Pica bactriana.*
سقوچاق	Sokocháq. A Wood-pecker, *Picus leucopterus.*
سن اورداک	Sun aurdák. The Mallard, *Anas boschas.*
سوپيا	Sopiá. The Indian Oriole, *Oriolus kundoo.*
سورام	Surám. A Wren Warbler, *Rhopophilus pekinensis.*
سوقن	Soqan. A Stork, *Ciconia.*
سوندوک	Sunduk. The Common Wagtail, *Motacilla alba.*
سيرام	Sairám. The Marsh Pipit, *Corydalla Richardi.*
شاياراق چوللوق	Sháyáráq chulloq. The Indian Ringed Plover, *Ægialites fluviatilis.*
شونقار	Shunqár. The Shunkar Falcon, *Falco Hendersoni.*

صايتورغاي	Sái torghái. The Horned Lark, *Otocoris penicillata.* See قراقاش تورغاي.
صاي يامغور- چي	Sái yámghurchi. The Kentish Ring Plover, *Ægialophilus cantianus.*
عقار	'Uqár. A Heron. See اوقار and اقاوقار.
عکّه	'Akka. The Andijani name for the Magpie. See سغزغان.
غاز	Gház. The Grey Lag Goose, *Anser cinereus.*
غجي	Ghiji. The Lammergeyer, *Gypaetus barbatus.*
غورکي	Ghorki. The Brown-headed Gull, *Xema brunneicephala.*
قارچیغه	Qárchigha. The Goshawk, *Astur palumbarius.*
قارغه	Qárgha. A Crow.
قارلوغاچ	Qárloghách. A Swallow.
قاشقالداق	Qáshqáldáq. The Common Coot, *Fulica atra.*
قاقشال پیچک	Qáqshál pichak. The Stilt, *Himantopus intermedius.*
قپاق تورغاي	Qapáq torghái. The Crested Lark, *Galerida magna.* See پوپشك تورغاي.
قرا باش قوچقاچ	Qará básh quchqách. A Bunting, *Emberiza pyrrhuloides.*
قرا چیکیت	Qará chikit. A Wheatear, *Saxicola Hendersoni.*
قرا سا	Qará sá. A Buzzard, *Buteo japonicus.*
قرا سوقن	Qará soqan. The Black Stork, *Ciconia nigra.*
قرا غاز	Qará gház. The Common Cormorant, *Graculus carbo.*
قرا قاشتورغاي	Qará kásh torghái. The Horned Lark, *Otocoris penicillata.*
قرا قارغه	Qará qárgha. The Black Crow, *Corvus culminatus.*
قرا قوچقاچ	Qará ḳuchḳach. The Common Starling, *Sturnus vulgaris.*
قرا قوش	Qara qush. The local name in Eastern Turkistan for the Golden Eagle, *Aquila chrysaetus.* See بورگوت.
قرغاول	Qirghaul. The Yarkand Pheasant, *Phasianus Shawi.*
قرغي	Qarghai. The Sparrow Hawk, *Accipiter nisus.*

قزيل باش اورداك	Qizil básh aurdák. The Red-crested Pochard, *Branta rufina.*
قزيل تومشوق قارغه	Qizil tumshuq qárgha. The Red-billed Chough, *Fregilus graculus.*
قزيل کورکاناك	Qizil kurkánák. The Redstart, *Ruticilla erythrogastra.*
قلاتي سا	Qiláti sá. The female Hen-Harrier, *Circus cyaneus.*
قل يورغه	Qil yurgha. The Swiftfoot, *Podoces Hendersoni.*
قم توخيسي	Qum tokhisi. The Little Bustard, *Otis tetrax.*
قم سغزغاني	Qum saghizghani. A name sometimes given to *Podoces Hendersoni.* See قل يورغه.
قناق اورداك	Qanak aurdák. The Shoveller, *Spatula clypeata.*
قنايچي	Qanáichi. The Reed Warbler, *Acrocephalus arundinaceus.*
قوچقاچ	Quchqách. Any small passerine bird; equivalent to *Chiria* in Hindustani.
قوش	Qush. Any large sized bird.
قوداي	Qodái. The Swan, *Cygnus olor.*
قودن	Qodan. The Water Hen, *Gallinula chloropus.*
قوزغون	Quzghun. The Tibetan Raven, *Corvus tibetanus.*
کرچ قارلوغاچ	Kirich qarlogháchch. A Swift, *Cypselus pekinensis.*
کرک اورداك	Karak aurdák. The Blue-winged Teal, *Querquedula circia.*
ککليک	Kaklik. The Chukor Partridge, *Caccabis chukor.*
ککّوک	Kakkok. The Common Cuckoo, *Cuculus canorus.*
کلخات	Kalkhát. The Andijani name for the Kite.
کورگاناك	Kurgánák. The Kestrel, *Tinnunculus alaudarius.*
کوکتالغو	Koktalghu. A Tree Warbler, *Phyllopneuste rama.*
کوکسا	Kok sá. The male Hen Harrier, *Circus cyaneus.*
کوکسوندوک	Kok sunduk. A Wagtail, *Motacilla personata.*
کوک قارغه	Kok qárgha. The European Roller, *Coracias garrula.*
کوگن	Kögan. The Indian Stock-pigeon, *Palumbæna Eversmanni.*
کول بوقهسي	Kul buqahsi. The Bittern, *Botaurus stellaris.*
کوشکل	Köshkal. The Stock-pigeon, *Columba œnas.*

گییه	Giya (? گریه Girya). The Sea Eagle, *Haliaetus leucoryphus.*
لاچین	Láchin. The Barbary Falcon, *Falco barbarus.*
لگ‌لگ	Laglag. The White Stork, *Ciconia alba.* See الاسوقان.
محرمچي	Maḥramchi. The Common Snipe, *Gallinago scolopacinus.*
مشک یاپالاق	Mashak yápáláq. The Long-eared Owl, *Otus vulgaris.*
مشک یام- غورچي	Mashk yámghurchi. The Greenshanks, *Totanus glottis.*
میزان سا	Mizán sá. The Kite, *Milvus melanotis.*
میینه	Maina. The Black-bird, *Merula vulgaris.*
وتوالاق	Watwáláq. The local Yarkandi name for the common Quail. See بیدنه.
هانگغوت	Hangghut. The Brahminy Duck, *Casarca rutila.*
هوپوپ	Hüpüp. The Common Hoopoe, *Upupa epops.*
هوي قوش	Hui qush. The Great Eagle Owl, *Bubo maximus.*
یاوا کبتر	Yawa kabtar. The Blue Hill Pigeon, *Columba rupestris.*
یاپالاق	Yápáláq. The Short-eared Owl, *Otus brachyotus.*
یار قارلوغاچ	Yár qárlogháçh. A Swift, *Cypselus acuticauda.*
یامغورچي	Yamghurchi. A name applied to several species of Waders.
یکن توخیسي	Yekan tokhisi. The Water Rail, *Rallus aquaticus.*

TURKI NAMES OF PLANTS.

By J. Scully, Esq.

ا

اچي چجغاك	áchî chijghák.
اچیغ انار	áchigh ánár.
اخچي کوکي	ikhchî kokî. Rape or Cole-seed, *Brassica napus.*
ادراسمان	ádrásmán. *Peganum harmala.* See gul ásmán.

ارامدان	árámadán.	Name of a tree, undetermined.
ارپه	árpa.	Barley, *Hordeum distichum.*
ارپه بادیان	árpa bádyán.	*Anisum sativum.*
ارپه خان	árpa khán.	
ارتیش	ártîsh.	The Pencil Cedar, *Juniperus excelsa.*
ارمن	árman.	Wormwood, *Artemisia vulgaris.*
ازغان	ázghán.	A species of Rose, *Rosa.*
اغاچه یوغوچ	ághácha yughuch.	A Cucurbitaceous Plant.
افتاب پرست	áftáb parast.	Sunflower, *Helianthus anuus.*
افیون گلي	áfiun guli.	Opium Poppy, *Papaver somniferum.*
اقارمن	áq árman.	A species of Wormwood, *Artemisia.*
اق المه	áq álma.	White Apple, *Pyrus malus.*
اق اوزوم	áq auzum.	White Grape, *Vitis vinifera.*
اق بادیان	áq bádyán.	Coriander, *Coriandrum sativum.*
اق باش اوت	áq básh aut.	Celery, *Apium graveoleus.*
اق پیاز	áq piaz.	A variety of Onion, *Allium cepa.*
اق تیکان	áq tikán.	Sea Buckthorn, *Hippophaë rhamnoides.*
اق تیکان	áq tikán.	A Shrub, *Lycium ruthenicum.*
اق جیگده	áq jigda.	White Eleagnus.
اق گل عنبر	áq gul' anbar.	A Centaurea.
اق چیچک اوت	áq chichik áut.	A species of Cress, *Lepidium latifolium.*
اق قوناق	áq qonáq.	The Great Millet, *Holcus sorghum.*
اق لاله	áq lála.	
اق لوبیا	áq lobiá.	White Pulse, *Dolichos lablab.*
اق ليلي قزاق	áq lailí qazáq.	White Opium Poppy, *Papaver somniferum.*
اق نبات	áq nabát.	A variety of Sweet Melon, *Cucumis melo.*
الا کوکي	ála koki.	
التونگل	áltun gul.	" Golden Flower."
القات	álqát.	
المورت	álmurt.	The Pear. See Amurt.
المه	álma.	The Apple, *Pyrus malus* or *Pyrus indica.*
آلوبالو	álo bálu.	
الوچه	álucha.	

آمورت	ámurt.	The Pear, *Pyrus communis.*
انار	ánár.	The Pomegranate, *Punica granatum.*
انارگلي	ánár guli.	Pomegranate blossom.
انجير	ánjír.	The Fig, *Ficus carica.*
انديجان اوزومي	ándiján ánzumí.	
نديجان گل	ándiján gul.	
اوجمه	áujma.	The Mulberry, *Morus alba.*
اوجون	áujun.	
اوروک	áuruk.	? The Plum.
اورهدان	áurahdán.	A Boragewort, *Asperugo procumbens.*
اوزوک	áuzuk.	
اوزون توروپ	áuzun turup.	Knol Kohl, *Brassica oleracea caulo-rapa.*
اوسمه	áusma.	
اوسون	áusun.	The Wild Cabbage, *Brassica oleracea.*
اوعزي تيكان	áughri tikán.	A Leguminous plant, *Astragalus sp.*
اولجا	áuljá.	The Apricot. See Aulja.
اولجه	áulja.	The Apricot, *Prunus armeniaca.*
آولمناق	áwul munáq.	A species of Spurge, *Euphorbia lathyris.*
اويدان	áuidán.	A species of Madder, *Rubia sp.*
ايتاوزوم	áit auzum.	
ايتخمكپلكي	áit khmak paliki.	See ait qoghūn.
ايتقوغون	áit qoghun.	A variety of Sweet Melon, *Cucumis melo.*
ايركاك اوجمه	áirkák aujma.	
ايركاكقوموش	áirkák qomush.	
ايشاكقوموش	áishák qomush.	Orache, *Atriplex sp.*
ايگر	áigar.	Sweet Flag, *Acorus calamus.*
ايناكفشتي	áinák fashti.	Castor oil seeds, *Ricinus communis.*
اييغقورماچي	áyigh qormáchi.	

ب

باجينچامغور	bájin chámghur.	
باجينقوغون	bajin qoghun.	Chinese Melon.
باجينگلي	bájín gulí.	A Larkspur, *Delphinium incanum.*

بادام	bádám. The Almond, *Amygdalus communis.*
باقلا	báqlá. A Bean, *Faba sp.*
بدنگان	badingan. The Egg-Plant, *Solanum melongena.*
بغداي	bughdáí. Common Wheat, *Triticum vulgare.*
بوخوار	bukhwár. A Cruciferous plant.
بودوشقاق	budushqáq. Burweed, *Xanthium strumarium.*
بورتسي	burtsi. A Chenopod, *Eurotia ceratoides.*
بورياوزوم	bori áuzum. Bladder-Senna, *Colutea arborescens.*
بوريپورچاقي	borí porcháqi.
بوريسمساقي	bori samsáqi. A Broomrape, *Orobanche sp.*
بورياپورماقي	bori yápurmáqi.
بوغز	bughaz. Corn.
بويه	buya. A Leguminous plant, *Sophora alopecuroides.*
بيده	baida. Purple Medick or Lucerne, *Medicago sativa.*
بي سي	baisai. The Turnip, *Brassica rapa.*
بيشک شرين	béshak shirin. A variety of Sweet Melon.
بيهي	bíhí. The Quince, *Pyrus cydonia.*

پ

پاقه پوتي قوموش	páqa puti qomush. A species of Reed.
پاقه ياپورماق	páqa yápurmáq. The Greater Plantain, *Plantago major.*
پالک	pálak. ? *Rhinacanthus communis.*
پتنگان	patingan. The Egg-Apple plant, *Solanum melongena.*
پوپوک سپورگي	pupuk suporgi. A Reed, *Arundo.*
پورچاق	porcháq. Common Pea, *Pisum sativum.*
پياز	piaz. Onion, *Allium cepa.*
پيازک	piázak.
پيزک	pizak. A Grass, *Calamagrostis laxa.*

ت

تاتليغ انار	tátligh ánár.
تاتليغ شفتول	tátligh shaftul. ? The Nectarine, *Amygdalus persica.*
تاج خوراز	táj khoráz. See Taji gul.

تاجي گل	táji gul.	The Cockscomb, *Celosia cristata.*
تاربوز	tárbuz.	The Water Melon, *Citrullus vulgaris.*
تاربوزک	tárbuzak.	A Cucurbitaceous plant, *Momordica Charantia.*
تارغاچ	tárghách.	
تال	tál.	
ترپ	turup.	The Radish, *Raphanus sativus.*
ريغ	tarigh.	Millet, *Panicum miliaceum.*
تماكو	tamáku.	Tobacco, *Nicotiana tabacum.*
توتوشقاق	tutushqáq.	Burdock, *Lappa major.*
توخوماك	tukhumák.	A Leguminous plant, *Sophora japonica.*
توزغاق	tozgháq.	
توغاچ	toghách.	
توغراغو	toghraghu.	
توغراق	toghráq.	A Poplar, *Populus balsamifera.*
توغراق تيلي	toghráq tílí.	
توكليک ارت	toklîk áut.	
توگه تاپاني	tuga tápáni.	
تيراك	tairak.	The White Poplar, *Populus alba.*
تيرتي سوگت	tairti sugat.	The Weeping Willow, *Salix babylonica.*
تلبه بيده	talba baida.	White Melilot, *Melilotus alba.*

ج

جاماقه	jámáqa.	A Pondweed, *Potamogeton natans.*
جانگدو	jángdu.	A small Bean.
جنسته	janasta.	The Plum, *Prunus domestica.*
جواني	juwani.	A species of Dill, *Anethum Sowa.*
جوخارگل	jokhár gul.	
جوري قند	jori qand.	A variety of Sweet Melon.
جيغده	jîghda.	A variety of Sweet Melon.
جيگده	jigda.	A species of Oleaster, *Eleagnus angustifolia.*

چ

چالنگ	chálang.	See Chilang.
چامغور	chámghur.	The Turnip, *Brassica rapa.*

چامغور چوچوکي	chamghur chuchuki.
چاي کوکي	chái koki.
چقیر اوجمه	chaqîr ánjma.
چلنگ	chilang. Cabbage, *Brassica oleracea.*
چوجون اوت	chujun áut. A species of Millet, *Panicum crus-galli.*
چوجون تریغ	chujun tarigh. A Fodder grass, *Panicum glaucum.*
چوچوک بویه	chuchuk buya. A species of liquorice, *Glycyrrhiza glandulifera.*
چوچوک بویه مونجاقي	chuchuk buya munjáqi.
چیغ	chîgh. A Grass, *Arundinella nepalensis.*
چیغیرتماق	chîghírtmáq. A species of Iris, *Iris soongarica.*
چیلان	chilán. The Jujube, *Zizyphus vulgaris.*
چیلکه زرداك	chîlka zardák.
چیلکي	chîlkî. A variety of Sweet Melon.
چینار	chinár. The Oriental Plane Tree, *Platanus orientalis.*
چینی گل	chînî gul. China Aster.

خ

خان گلی	khán guli. French Marigold, *Tagetes patula.*
خطاي خینه	khaṭái khina. A species of garden Balsam.
خطاي سپورگیسي	khaṭái supurgisi. An Amaranth, *Amaranthus blitum.*
خطاي گل	khaṭái gul. China Aster, *Callistephus chinensis.*
خوخاه	khokhá. A Composite plant.
خوخه تیکان	khokha tikán. A kind of Thistle, *Cnicus arvensis.*
خوخه گل	khokha gul. ? *Cnicus arvensis.*
خونگان	khongán. Cucumber, *Cucumis sativus.*

د

داوا	dáwá. Tamarisk, *Tamarix sp.*
داودر	dáudar. French Bean, *Phaseolus vulgaris.*
دودو	dodo. A species of Yam, *Dioscorea deltoida.*

ز

زاغون	zághun. Wild Nevew, *Brassica campestris.*
زردک	zardak. The Carrot, *Daucus carota.*
زرنگزه	zarangza. The Safflower Plant, *Carthamus tinctorius.*
زعفر گل	za'far gul. ? Saffron plant, *Crocus sativus.*
زغیر	zighir. Flax, *Linum usitatissimum.*
زیخ	zíkh.

س

ساپقسزگل	sápaqsiz gul. = sapaqsi gul.
سپورگی	supurzi. An Amaranth, *Amaranthus blitum.*
سپورگي	supurgi. A species of Tamarisk, *Tamarix elongata.*
سده	sada. The Elm, *Ulmus erosa.*
سریغ ازغان	sarigh azghán. Yellow Rose, *Rosa brunonii.*
سریغ اوت	sarigh áut. A grass found growing at high elevations.
سریغ بویه	sarigh buya. A Leguminous plant, *Sophora sp.*
سریغ تلبه بیده	sarigh talba baida. Common or Yellow Melilot, *Melilotus officinalis.*
سریغ زاردک	sarigh zárdak.
سریغ سبه	sarigh sabba, Pot Marigold, *Calendula officinalis.*
سریغ سنبرگل	sarîgh sanbar gul. African Marigold, *Tagetes erecta.*
سریغ سوگت	sarigh sugat. " Yellow Willow."
سریغ عشق پیچاق	sarigh 'ashq picháq. Indian Cress, *Tropeolum majus.*
سریغ گل	sarigh gul. A Marigold, *Calendula stellata.*
سریغ هفرانگ	sarigh hafaráng. *Tropeolum.*
سریغ یورگاماچ	sarigh yurgámách. A species of Dodder, *Cuscuta sp.*
سریمساق	sarimsáq. ? Garlic, *Allium sativum.*
سمساق پیاز	samsáq piáz. A variety of Onion, *Allium cepa.*
سوتلیک اوت	sutlik áut. A species of Sow-thistle, *Mulgedium tataricum.*
سوسن گل	sosun gul. A species of *Iris.*
سوسنی عشق پیچک	sosuni 'ashq pichak.

سوک	sok.	A Grass, *Polypogon monspeliensis.*
سوگت	sugat.	A Willow, *Salix daphinoides.*
سولوق اوت	suluq áut.	
سونگ پیاز	song piáz.	
سیاه دانه	siáhdána.	Fennel Flower, *Nigella sativa.*
سیمز اوت	simaz áut.	

ش

شاتوت	shátut.	A species of Mulberry, *Morus lævigata.*
شال	shál.	The Rice plant, *Oryza sativa.*
شالدیر بویه	sháldîr buya.	
شالدیر لاغوچ	shaldîr lághuch.	A Leguminous plant, *Sphærophysa sp.*
شفتول	shaftul.	The Peach, *Prunus persica.*
شلغوت	shalghut.	
شمشا	shumshá.	The Ferngreck, *Trigonella fœnum-græcum.*
شوخلا	shokhlá.	A species of Night-shade, *Solanum nigrum.*
شوم بویه	shum buya.	A species of Broomrape, *Phelipæa indica.*

ع

عشق پیچاک	'asuq pichák.	A Bindweed, *Pharbitis nil.*
عینالو	'ainálu.	

غ

غشه	ghasha.	

ف

فاخته اوروغی	fákhta áurughî.	Cotton seeds, *Gossypium herbaceum.*
فالاک	fálák.	*Tribulus terrestris.*
فیاز	fiáz.	Onion, *Allium cepa.*
فرنگ گلی	farang gulí.	

ق

قاپاق	qápáq.	The Gourd, *Cucurbita pepo.*
قاپاق تیراک	qápáq tairák.	"Gourd Poplar."
قارغه تامغاقی	qárgha tamgháqi.	A Composite plant, *Phœnopus orientalis.*

قارغه تامغاقي	qárgha tamgháqi. A Figwort, ***Dodartia orientalis.***
قارغهتامغاقي اوت	qárgha tamgháqi áut. A Leguminous plant, ***Oxytropis sophora.***
قارغهجيگدهسي	qárgha jigdahsi. A species of ***Eleagnus.***
قاغز اوت	qághaz áut. Milk Thistle, ***Sonchus oleraceus.***
قامچي گل	qámchi gul. The Love-lies-bleeding Amaranth, ***Amaranthus candatus.***
قامچي گل	qámchi gul. Garden Persicary, ***Polygonum orientale.***
قامغاق	qámgháq. A Saltwort, ***Salsola collina.***
قايروم	qáirum.
قرا ارمن	qará árman.
قرا اوجمه	qará áujma. A species of Mulberry, ***Morus atro-purpurea.***
قرا اوروک	qará áuruk. Apricot, ***Prunus armeniaca.***
قرا سونه	qará sona. A species of Sow-thistle, ***Sonchus.***
قرا شوخلا	qará shokhalá. A Night-shade, ***Solanum nigrum.***
قرا گل	qará gul. A species of Marsh Mallow, ***Althæa rosea.***
قرا يغاچ	qará yughách. A species of Ash, ***Fraxinus Moorcroftiana.***
قزيل ازغان	qazíl ázghán. Red Rose.
قزيل پاچاق	qizíl pácháq.
قزيل پياز	qizíl piáz. Red onion.
قزيل توروپ	qizíl turup. Red Radish, ***Raphanus sativus.***
قزيل جنسته	qizil janasta.
قزيل جيگده	qizíl jigda. An Oleaster, ***Eleagnus parviflora.***
قزيل خينه	qizil khina. A variety of garden Balsam.
قزيل زرداك	qizil zardák.
قزيل گل	qizíl gul. The Rose, ***Rosa macrophylla.***
قزيل لاله	qizíl lálá.
قزيل ليلي قزاق	qizíl laili qazáq. Red Opium Poppy, ***Papaver somniferum.***
قزيل مورچ	qizíl morch. Spur Pepper, ***Capsicum frutescens.***
قزيل يولغون	qizíl yulghun. Tamarisk, ***Tamarix gallica.***
قلاقاى	qaláqái. ? ***Amaranthus.***
قوغون	qoghun. Sweet Melon.
قوكوكي	qo koki. A species of Sorrel, ***Rumex klotschianus.***

قوموش	qomush.	A Reed, *Arundo madagascariensis.*
قومي	qummi.	The Melon, *Cucumis melo.*
قوناق	qonáq.	Maize or Indian-corn, *Zea mays.*
قونگان	qongán.	Cucumber, *Cucumis sativus.*
قوي كوكي	quikoki.	The Dock, *Rumex aquaticus.*
قياق اوت	qiyáq áut.	A species of grass, *Calamagrostis Nepalensis.*
قيچي	qichi.	Indian Mustard, *Sinapis juncea.*
قيشليک توروپ	qaishlik turup.	A Cruciferous plant.

ک

كاه لوه	káhloh.	The Persimon, *Diospyros kaki.*
كبرايا	kibráyá.	An Umbelliferous plant.
كرم	karam.	
كرمک	kurmak.	
ككره	kakra.	
ككوک كوكى	kakkok koki.	Sow-thistle, *Sonchus sp.*
ككيه	kakia.	A Spurge, *Euphorbia sp.*
كمپه	kampa.	A species of Wormwood, *Artemisia sp.*
كوده	koda.	Onion, *Allium cepa.*
كوده آمورت	koda amurt.	? A variety of Pear.
كوزگي بغداى	kozgi bughdái.	
كوک شوخلا	kok shokhllá.	A species of Night-shade, *Solanum nigrum.*
كوک عشقه پيچاک	kok 'ashqa pichák.	
كوک لوبيا	kok lobiá.	A variety of Bean.
كوكنار	koknár.	The Field Poppy, *Papaver rhœas.*
كوكيا	kokia.	An Onagrad, *Œnothera mollissima.*
كونجد	kunjud.	A Cruciferous plant.
كوه	kawa.	
كيبز	kaibaz.	The Cotton plant, *Gossypium herbaceum.*
كيبز اناسي	kaibaz anasi.	A plant of the Mallow family, *Abutilon avicennæ.*
كيک تيلي	kaik tili.	A Spurge, *Euphorbia sp.*

AN INTRODUCTION

TO THE

MAITHILÍ LANGUAGE

OF

NORTH BIHÁR

CONTAINING

A GRAMMAR, CHRESTOMATHY & VOCABULARY.

BY

GEORGE A. GRIERSON, B. C. S.

PART I.

GRAMMAR.

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INTRODUCTION.

In submitting the following somewhat full Grammar of the Maithilí dialect to the Society, I wish to explain the sources of my information.

They may be divided into two classes.

1*st.*—Forms obtained by translating into Maithilí.

2*nd.*—Forms obtained by translating from Maithilí.

The first I obtained as follows. I printed paradigms of all the forms in Hindí and Saṃskṛit Grammar and circulated them as widely as possible amongst the Paṇḍits, Village School Masters and educated Native Gentlemen of Northern Mithilá, with directions to give the exact translation of each of these forms in their own native language.

I was enabled in this way, to collect some fifty most useful books of forms, supplied by representatives of all classes of society, from the village *guru,* who knew little more than the herd-boys he taught, to the most learned Paṇḍits of Mithilá. I am glad to say that the utmost interest was taken in my design, for the people are proud of their language and were pleased at the idea of its being made a polite one, by obtaining the honour of print. I shall have more to say on this point bye and bye. These books of paradigms formed the basis of this Grammar. They were compared with each other; and where one was found wanting, another supplied the deficiency. At the same time, it must not be imagined that they showed many mutual discrepancies: on the contrary, considering the many varied sources from which they were derived, their unanimity was wonderful and justifies me in hoping that what I here publish will be found fairly accurate.

With regard to the forms obtained by translating from Maithilí, they were obtained in various ways. In cutcherry I collected myself a large number of words from the mouths of the witnesses who came in from a distance. These I found very useful in checking the books of forms above referred to. I also collected a number of country songs, which afforded invaluable materials when properly sifted.

From these two sources, aided by the practical knowledge possessed by myself and one or two native friends, the following grammar has been compiled. I wish I could believe that it is thoroughly accurate; all I can say is that we have done our best to make it as accurate as possible.

Our greatest difficulty has been experienced from the luxuriance of the language. The verb, especially, much tried our patience. Maithilí is a *bolí* in the literal sense of the word. Beyond a History of Kṛishṇa and the songs of Vidyápati Ṭhákur, I know of no literary work which it possesses. It is emphatically a spoken language. There is no standard to which it can be referred, and hence no form can be put aside as vulgar or impure. It is hoped, not only by myself, that the publication of a treatise like the present will tend to fix a standard and to foster a literature which might easily arise in so racy and fluent a language.

For Maithilí *is* a language and not a dialect. It is the custom to look upon it as an uncouth dialect of untaught villagers, but it is in reality the native language of more than seven and a quarter* millions of people, of whom, as will be borne out by every official having experience of North Bihár, at least five millions can neither speak nor understand either Hindí, or U'rdú without the greatest difficulty. It differs from both Hindí and Bangálí, both in Vocabulary and in Grammar, and is as much a distinct language from either of them as Maráṭhí or Uṛiyá. It is a country with its own traditions, its own poets, and its own pride in everything belonging to itself.

For this reason, I hope that this grammar may be found useful to the officials who are brought into every day contact with the country, and that the too often, I fear, contemptuous ignorance exhibited of the *gãõwárí*, may be superseded by a desire to learn a language, which cannot fail to be useful to them, and the acquirement of which is now made easier.

Maithilí is spoken by all the Hindús and Muhammadans, who inhabit the great plain which is bounded on the North and South by the Himálayas and the Ganges, and on the East and West by the Kośí and Gaṇḍak respectively. It is thus the native language, not only of the 7¼ millions of North Bihár, but also of the unnumbered millions of the Nepál Taráí, bordering on the districts of Champáran, Tirhut and Bhágalpúr. It has various dialects, differing slightly from each other, the two extremes being that of Champáran on the west, which approaches the language of Chaprá, and that of Bhágalpúr on the east which contains a few forms tending towards Bangálí. The dialect which I have adopted as a standard is that of the Madhubaní Sub-division, which is centrally situated, and which is admitted by all Bráhmaṇs to be the head-quarters of Mithilá. I have a practical and personal knowledge of the dialects of North Bhágalpúr,

---

* POPULATION OF—

Champáran	14,40,815
Tirhut	43,84,706
Begu Sarai Sub-Division of Munger	6,37,725
Supaul " " Bhágalpúr	5,65,747
Madhaipúrá " " "	3,91,086
TOTAL ...	73,20,079

Darbhangá (including Madhubaní) and Muzaffarpúr districts. The dialect of Champáran I only know through writings, and through information acquired from natives of that district whom I have met.

As to the character of the language, it is comparatively free from admixture with foreign words. It abounds in words of Hindúí origin, is composed mainly of words derived through Prákṛit from Saṃskṛit, and at the same time borrows freely from Saṃskṛit itself. Even the Musalmáns, while of course using more Arabic and Persian words than the Hindús, abstain from using them to anything like the extent to which their U'rdú speaking brethren of the north-west affect them, not excepting their sacred hymns connected with their religion. I give a few examples of these in the Appendix, and it will be noticed how extremely free they are, for their subject, from foreign words.

In conclusion, I have only to put on record my indebtedness to Mr. Etherington's excellent Hindí grammar. I have had it constantly by my side, and I have made its arrangement the skeleton which I clothed with Maithilí forms. In some paragraphs I have actually used Mr. Etherington's language; and I offer no excuse for doing so, as it would be impossible for me to express the subject-matter in clearer language, or in fewer words.

MAITHILÍ GRAMMAR.

PART I.

CHAPTER I.

THE ALPHABET.

§ 1. The Alphabets in use in Mithilá are three.—The Deva-nágarí, the Maithilí, and the Káyathí. The first is familiar to every reader of this, and need not be described here. It is not much used in common life, and seldom even in manuscripts.

§ 2. The Maithilí is the character used by the Maithil Bráhmaṇs, both in the affairs of common life, and in their sacred books. Few of the Bráhmaṇs, who are not professed paṇḍits, can read the Deva-nágarí character. The Maithilí character is also affected by Maithil Káyasthas, who pretend to be better educated than their fellows. The Maithilí character is nearly the same as Bangálí, differing only in one or two letters.

§ 3. The Káyathí character is that in general use throughout Mithilá by all educated persons who are not Bráhmaṇs. It is a corruption of the Deva-nágarí, and can be written much faster than the latter, or even than *shikasta* U'rdú. There is a clerk in my office in Madhubaní, who can write excellent Káyathí much quicker than even the most practised of the old "Persian" muharrirs. Besides the speed with which it can be written, it has the advantage of thorough legibility. It is being gradually introduced by Government into official documents and with considerable success, in spite of the opposition of the old Persian School of Government officials.

§ 4. A lithographed comparative table, giving specimens of these three alphabets, will be found at the end of this grammar.

Pronunciation.

(a.) Vowels.

§ 5. The vowels should be pronounced as in Saṃskṛit, with the following exceptions.

§ 6. The pronunciation of the vowel अ *a* is peculiar. It is not so broad as that of the corresponding vowel in Bengálí, but on the other hand it is broader than that of the neutral vowel in High Hindí. I know of no sound exactly equivalent to it in any language with which I am acquainted. The best way of describing it is by saying that it is half way between the *o* in *not*, and the *u* in *nut*, when preceded by a hard guttural check, and followed by a soft labial check. It thus may be said to be the *u* in *cub*, rounded, or the *o* in *cob*, neutralized.

§ 7. *In words of more than one syllable*,—the short vowels अ *a*, इ *i*, and उ *u*, when final and preceded by consonants are not pronounced in prose and conversation. This is absolute in the case of अ *a*. E.g., फल, is pronounced *phal*, and not *phala*. With respect to इ *i* and उ *u*, the sound of the vowel, when written, does not entirely disappear. It however is pronounced very slightly indeed, being little more than an aspirate with the *colour (timbre, tonfarbe)* of the vowel.* When इ *i* and उ *u* are thus pronounced, I shall throughout this grammar represent them (in transliteration) by a simple apostrophe, and not by *i* or *u*, in order to prevent a tendency to mispronunciation. E.g. हून्हि, will be written *húnh'*. It must be remembered however that this apostrophe must, in pronunciation, be *coloured* by the omitted vowel. Thus the pronunciation of the apostrophe in *húnh'*, for हून्हि, is very different from that of the apostrophe in *ah'* for अहु. In the first it is coloured by the tone of the palatal vowel *i*, while in the second it is coloured by the tone of the labial vowel *u*. This final apostrophe can be nasalized by *anunásika*. E.g. नहिँ *nah'ñ*.

As in High Hindí, अ *a*, when unaccented and falling between two consonants, is frequently omitted in pronunciation in prose and conversation. This is especially noticeable in the conjugations of verbs. Throughout this grammar, I shall represent this unpronounced, unaccented अ *a*, in transliteration, by an apostrophe, ', which in this case will have a slight colour of the tone of the guttural vowel अ *a*. E.g. देखलिऐ, *dekh'liai*.

§ 8. It will thus be seen that I shall employ this apostrophe(') to represent three distinct colours of tone, a guttural colour, when medial and representing a *medial* अ *a*, and a palatal or labial colour, when final and representing a *final* or nasalized final इ *i* or उ *u*, respectively. And logically, I ought to represent the inert final अ *a* also by a guttural apostrophe, but this is neither customary nor necessary and would only tend to confusion. It is simpler to remember that medial apostrophe stands for guttural अ *a*, and that a final apostrophe or a final apostrophe nasalized, stands for a palatal इ *i* or a labial उ *u*, either simple or nasalized, respectively.

§ 9. ऐ *ai* is pronounced like the English word "I," and never like *oi*. It thus differs from अय् *ay* which has a broader sound. E.g. हैब *haib* is pronounced very differently from हयब *hay'b*.

§ 10. (ँ) *Anunásika* is pronounced like the nasal sound in the French word "*bon*". It will, throughout this grammar, except when final after a short vowel which is not pronounced, be represented in transliteration by a circumflex over the qualified vowel. Thus अँ will be represented by ã, आँ by ã', इँ by ĩ, ईँ by ĩ', and so on. E.g. बाँहि bã'h'. When final, after a short vowel which is not pronounced, as explained in § 7, it will be represented by ñ. Thus, नहिँ nah'ñ.

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* A similar peculiarity is observed in Sindhí and Telugu.

Anusvára(ˑ) will only be used throughout this grammar as a *compendium scripturae* for ङ् *n*ˑ, ञ् *ñ*, ण् *ṇ*, न् *n*, or म् *m* before another consonant of the same class. Thus बुंदा instead बुन्दा *bundá*. It will hence be represented in transliteration by *n*ˑ, *ñ*, *ṇ*, *n*, or *m*, according to circumstances. This distinction between *anunásika* and *anusvára* is adopted in order to prevent any misapprehension as to pronunciation.

(*b*). *Consonants.*

§ 11. क *k*, ख *kh*, ग *g*, घ *gh*, ङ *n*ˑ, च *ch*, छ *chh*, ज *j*, झ *jh*, ञ *ñ*, ट *ṭ*, ठ *ṭh*, ड *ḍ*, ड़ *ṛ*, ढ *ḍh*, ढ़ *ṛh*, त *t*, थ *th*, द *d*, ध *dh*, न *n*, प *p*, फ *ph*, ब *b*, भ *bh*, म *m*, य *y*, र *r*, ल *l*, व *v*, श *s'*, स *s*, and ह *h'* are usually pronounced as in Saṃskṛit. As usual in modern A'ryan languages, ज and य, and ब and व are frequently confounded both in pronunciation and in writing. I shall endeavour throughout this grammar to represent all *j* sounds by either ज or य, *y* sounds by य़, *b* sounds by either ब or व, and *v* and *w* sounds by व़ respectively. It is not usual, however, to make these distinctions in writing.

§ 12. The pronounciation of ण *ṇ* is peculiar. The lingual nature of its sound is much more marked than in the Saṃskṛit of Western India. It has more the sound of a muffled lingual *r* followed by a lingual *ṇ*; e.g. रावण is pronounced almost like *Rábarṇ*, the *r* in *rṇ* having a peculiar muffled sound, impossible to describe in writing. न *n* is occasionally substituted for ण *ṇ* and is then pronounced as *n*.

§ 13. ष *sh*, when standing alone and not compounded with another consonant, is always pronounced as ख *kh*. Thus षष्ठ *shashṭh* "sixth" is pronounced *khashṭh*. This pronunciation is universal: the vulgar even write such a ष *sh*, phonetically ख *kh*. In the compound consonant र्ष *rsh*, ष *sh* is also always pronounced as ख *kh*; e.g. आकर्षण *ákarshaṇ* is pronounced *ákarkhaṇ*. A similar pronunciation is optional in the compound ल्ष *lsh*; e.g. the word सुवल्षु (Saṃs. loc. plur of सुवल्) is pronounced either *suvalshu* or *suvalkhu*. By some this ख *kh* sound of ष *sh* is pronounced as a guttural breathing, and not as a guttural check,—something, but not quite, like the Persian خ *kh*, or the *ch* in *loch*. This pronunciation is, however, condemned by the best paṇḍits. The compound letter क्ष *ksh* is pronounced like च्छ *chchh*, which is occasionally written for it by the vulgar; *e.g.* लक्ष्मी is so written, and is pronounced as *Lakshmí* by purists, but is commonly written and pronounced लच्छमी *Lachchh'mí*. The compound ष्प *shp* is peculiar. It is pronounced something like *hfp*; *e.g.* पुष्प *pushp* "a flower" is pronounced *puhfp*.

§ 14. The letter ह *h*, when compound with य *y*, becomes ह्य *hy*, which is pronounced in a peculiar way. If *zh* be taken to represent the Persian ژ *zh*, the pronunciation of this compound can best be represented by *zhjy*; *e.g.* ग्राह्य, *fit to be accepted*, is pronounced *grázhjya*, the final अ *a* being retained in pronunciation, though usually inert, for the sake of euphony.

PART II.

NOUNS, ADJECTIVES AND PRONOUNS.

CHAPTER II.

GENDER, NUMBER AND CASE.

§ 15. The noun has two Genders,—Masculine and Feminine. Words derived direct from the Saṃskṛit, which were originally neuter, become masculine in Maithilí.

There are two numbers, the Singular, and the Plural.

§ 16. There are (counting the vocative) eight cases,—*viz.*, Nominative Accusative, Instrumental, Dative, Ablative, Genitive, Locative and Vocative.

§ 17. The NOMINATIVE has one invariable form, which is the same before all kinds and before all tenses of verbs. The vulgar, however, capriciously add the termination उआ *uá* or आ *á* to all nominatives, especially to those of proper names. E.g. घर *ghar* or घरुआ *gharuá*, a house; रघू *Raghú* or रघुआ *Raghuá*, a proper name: नेनी *není* or नेनिआ *neniá*, a girl.

§ 18. The ACCUSATIVE is formed by adding the postposition कें *kē* to the nominative. This postposition is however commonly dropped in writing and conversation, when no ambiguity is likely to arise. It is forbidden, however, to drop this postposition in this way, in the case of the pronouns of the first and second persons, for which special forms are provided. Throughout the ensuing paradigms, the termination is always given, but it must be understood, that, except in the cases above mentioned, it can optionally be discarded. In different parts of Mithilá the postposition is written के *ke*, कें *kē*, कैं *kãi*, and काँ *kā̃'*. The oldest form, which is met with most frequently in poetry, is कैं *kãi*, but the one most commonly used nowadays is कें *kē*.

§ 19. The INSTRUMENTAL denotes the instrument, means, cause, or agent by which a thing is done. It in no way corresponds to the so-called agent in Hindí, which is used before the past tenses of transitive words. It is usually formed by adding सँ *sã*, of which सोँ *sõ* is an occasional variety. सोँ *sõ* is the poetical and older form. There is another form of the instrumental made by the addition of the syllable एँ *ẽ*. This is formed in two ways.

A. by the substitution of एँ *ẽ* for the final vowel in,—

(1) all nouns ending in अ *a*, which is not pronounced; e.g. फल *phal*, *fruit*, has for one of the forms of its instrumental फलेँ *phalẽ*.

(2) All nouns ending in आ *á*, *whether directly borrowed from Saṃskṛit, or from Prákritic sources*. E.g. कथा *kathá*, *a saying*, makes one of its instrumental forms कथेँ *kathẽ*, and नेना *nená*, *a boy*, similarly makes नेनेँ *nenẽ*.

B. In all other nouns by the simple addition of एँ *ẽ*, before which a final long vowel is shortened. Thus पानि *páni*, *water*, becomes in one form of the instrumental singular पानिएँ *paniẽ*, and बेटी *betí*, *a daughter*, similarly becomes बेटिएँ *beṭiẽ*.

§ 20. The Dative "is the case of the recipient or that form of the noun which indicates that in which the object of an action rests." It is similar in form to the Accusative, but the postposition के *ke*, केँ *kẽ*, कैँ *kãi* or काँ *kã'* is not liable to be dropped.

§ 21. The Ablative indicates separation or removal from. It is formed by adding the postposition सँ *sã*, of which सोँ *sõ* is an occasional variety. सोँ *sõ* is the poetical and older form.

§ 22. The Genitive "denotes connection generally, whether arising from origin or possession." Its sign is क *k*. An older form, but still in occasional use, is केर *ker*. In the pronouns, too, the distinguishing termination of the genitive is the letter र *r*. None of these three postpositions, क *k*, केर *ker* or र *r*, shows any symptom of being influenced by gender, as is the case with the corresponding Hindí postpositions का *ká*, के *ke* and की *kí*. Although really ending in an inherent short अ *a*, this final vowel is not pronounced in prose or in conversation, so that क *k*, केर *ker* and र *r* are usually pronounced as if they were क् *k*, केर् *ker* and र् *r*. In order to prevent mispronunciation, throughout the following paradigms, the postpositions क and र are written as part of the qualifying word. Thus नेनाक *nenák*, हमर *hamar*, and not नेना क *nená k*, हम र *ham r*, which would be the more logical way of writing them. But it must never be forgotten that क and र are postpositions and have not yet been so amalgamated with the principal word, that the whole forms one inflected base.

§ 23. The Locative indicates the place in, or the time at which a thing is done. It is formed usually by the postposition मेँ *mẽ*, of which माँ *mã* and मोँ *mõ* are optional forms. Of these three forms, मोँ *mõ* is the oldest and is usually found in poetry. An old form of the Locative ended, like the Saṃskṛit, in ए *e*. It now, however, appears in only a few adverbial sentences, such as घरे घरे *ghare ghare*, *in every house*.

§ 24. The Vocative usually takes the same form as the Nominative. In speaking to a person of lower rank or age, the termination वा *vá* or आ *á* is used as follows. नेना *nená*, *a boy*, becomes रौ नेनवा *rau nen'vá*. नेनी *není*, *a girl*, becomes गै नेनिआ *gai neniá*. रघू *Raghú*, a proper name, becomes रौ रघुआ *rau Raghuá*.

The following interjections are used with the vocative.

(*a.*) With masculine inferiors,—or familiarly, रौ *rau*, रे *re*.

(*b.*) With masculine equals or superiors, औ *au*, हौ *hau*, हे *he*.

(*c.*) With feminine inferiors,—or familiarly, गै *gai*.

(*d.*) With feminine equals or superiors, है *hai*.

CHAPTER III.

ON NUMBER.

§ 25. The plural number of nouns in Maithilí is simply formed by the addition of a noun signifying multitude. Those most commonly used are सभ *sabh* and सवहि *sabah'* meaning *all*, and लोकनि *lokani** meaning *people*. The last is only used with animate objects. सभ *sabh* and सवहि *sabah'* can be used indifferently either before or after the qualified noun. Thus नेना सभक *nená sabhak*, नेना सवहिक *nená sab'hik*, सभ नेनाक *sabh nenák*, सवहि नेनाक *sabah' nenák* and नेना लोकनिक *nená lokanik* are all possible forms of the genitive plural of नेना *nená*, *a boy*. लोकनि *lokani* be it observed, can only be used *after* the qualified noun. In all cases, whatever be the order of the words, the postposition deciding the case comes last.

§ 26. The same rules partially apply to pronouns: but, in addition to the word signifying plurality, many of them have entirely new bases for their plural forms.

§ 27. Throughout the following Paradigms, I shall generally only use the word सभ to designate the plural; but it must always be understood that unless specially forbidden, सवहि *sabah'* and लोकनि *lokani* can also be used.

CHAPTER IV.

DECLENSION OF NOUNS.

§ 28. There is in Maithilí really only one declension, but as the forms of some classes of nouns vary slightly from each other before some of the postpositions, it will be convenient to consider nouns in three classes.

§ 29. I. The first class will consist of all nouns ending in आ *á*.

II. The second class will consist of all nouns ending in inherent अ *a*, when it is not pronounced.

III. The third class will consist of all other nouns.

The difference between these three classes will be noticed on comparison of the Instrumental and Vocative singular.

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* The final *i* in this word is pronounced.

CLASS I.

ALL NOUNS ENDING IN आ *á*.

§ 30. (1) Example of a Masculine noun ending in आ *á*.

नेना *nená*, a boy.

SINGULAR एकवचन *Ek'vachan*.

Nom.	नेना *nená*, a boy.	
Acc.	नेना *nená*,	a boy.
	नेना केँ *nená kẽ*,	
Inst.	नेनेँ *nenẽ*,	by a boy.
	नेना सँ *nená sã*,	
Dat.	नेना केँ *nená kẽ*, to a boy.	
Abl.	नेना सँ *nená sã*, from a boy.	
Gen.	नेनाक *nenák*,	of a boy.
	नेनाकेर *nenáker*,	
Loc.	नेना मेँ *nená mẽ*, in a boy.	
Voc.	रौ नेनवा *rau nen'vá*, O boy, *(or respectfully)* औ नेना *au nená*.	

PLURAL बहुवचन *Bahuvachan*.

Nom.	नेना सभ[1] *nená sabh*, boys.	
Acc.	नेना सभ[1] *nená sabh*,	boys
	नेना सभकेँ[2] *nená sabh kẽ*,	
Inst.	नेना सभेँ[3] *nená sabhẽ*,	by boys.
	नेना सभ सँ *nená sabh sã*,	
Dat	नेना सभ केँ[4] *nená sabh kẽ*, to boys.	
Abl.	नेना सभ सँ[5] *nená sabh sã*, from boys.	
Gen.	नेना सभक[6] *nená sabhak*,	of boys.
	नेना सभकेर *nená sabh'ker*,	
Loc.	नेना सभ मेँ[7] *nená sabh mẽ*, in boys.	
Voc.	रौ नेनवा सभ[8] *rau nen'vá sabh*,	O boys.
	औ नेना सभ *au nená sabh*,	

[1.] Other forms are सभ नेना *sabh nená*, नेना सबहि *nená sabah'*, सबहि नेना *sabah' nená* and नेना लोकनि *nená lokani*.

[2.] Other forms are नेना सबहिकें *nená sabah' kē*, and नेना लोकनि कें *nená lokani kē*.

[3.] Other forms are नेना सबहिएँ *nená sab'hiē*, नेना सबहि सँ *nená sabah' sā̃*, नेना लोकनिएँ *nená lok'niē* and नेना लोकनि सँ *nená lokani sā̃*.

[4.] Other forms are नेना सबहि कें *nená sabah' kē* and नेना लोकनि कें *nená lokani kē*.

[5.] Other forms are नेना सबहि सँ *nená sabah' sā̃* and नेना लोकनि सँ *nená lokani sā̃*.

[6.] Other forms are नेना सबहिक *nená sab'hik*, नेना लोकनिक *nená lokanik*.

[7.] Other forms are नेना सबहि में *nená sabah' mē* and नेना लोकनि में *nená lokani mē*.

[8.] रौ नेना सबहि *rau nená sabah'*, औ नेना लोकनि *au nená lokani*.

§ 31. (2) Example of a feminine noun, ending in आ *á*.

कथा *kathá*, a story.

SINGULAR एकव्चन *Ek'vachan*.

Nom.	कथा *kathá*, a story.	
Acc.	कथा *kathá*, कथा कें *kathá kē*,	a story.
Inst.	कथें *kathē*, कथा सँ *kathá sā̃*,	by a story.
Dat.	कथा कें *kathá kē*, to a story.	
Abl.	कथा सँ *kathá sā̃*, from a story.	
Gen.	कथाक *kathák*, कथाकेर *katháker*,	of a story.
Loc.	कथा में *kathá mē*, on a story.	
Voc.	हे कथा *he kathá*, O story.	

PLURAL बहुवचन *Bahuvachan.*

Nom.	कथा सभ *kathá sabh*, stories.	
Acc.	कथा सभ *kathá sabh*, कथा सभ कें *kathá sabh kē*,	stories.
Inst.	कथा सभें *kathá sabhē*, कथा सभ सँ *kathá sabh sã*,	by stories.
Dat.	कथा सभ कें *kathá sabh kē*, to stories.	
Abl.	कथा सभ सँ *kathá sabh sã*, from stories.	
Gen.	कथा सभक *kathá sabhak*, कथा सभकेर *kathá sabh'ker*,	of stories.
Loc.	कथा सभ में *kathá sabh mē*, in stories.	
Voc.	हे कथा सभ *he kathá sabh*, O stories.	

CLASS II.

ALL NOUNS ENDING IN INHERENT अ *a*, WHEN THIS LETTER IS NOT PRONOUNCED.

§ 32. (1) Example of a masculine noun, ending in अ *a*.

फल *phal*, a fruit.

SINGULAR एकवचन *Ek'vachan.*

Nom.	फल *phal*, a fruit.	
Acc.	फल *phal*, फल कें *phal kē*,	a fruit.
Inst.	फलें *phalē*, फल सँ *phal sã*,	by a fruit.
Dat.	फल कें *phal kē*, to a fruit.	
Abl.	फल सँ *phal sã*, from a fruit.	
Gen.	फलक *phalak*, फलकेर *phal'ker*,	of a fruit.
Loc.	फल में *phal mē*, in a fruit.	
Voc.	हे फल *he phal*, O fruit.	

PLURAL बहुवचन *Bahuvachan.*

Nom.	फल सभ *phal sabh*, fruit.	
Acc.	फल सभ *phal sabh*,	fruit
	फल सभ कें *phal sabh kē*,	
Inst.	फल सभें *phal sabhē*,	by fruit.
	फल सभ सँ *phal sabh sā*,	
Dat.	फल सभ कें *phal sabh kē*, to fruit.	
Abl.	फल सभ सँ *phal sabh sā*, from fruit.	
Gen.	फल सभक *phal sabhak*,	of fruit.
	फल सभकेर *phal sabh'ker*,	
Loc.	फल सभ में *phal sabh mē*, in fruit.	
Voc.	हे फल सभ *he phal sabh*, O fruit.	

CLASS III.

ALL NOUNS NOT ENDING IN आ *á*, OR SILENT अ *a*,

§ 33. (1) Example of a masculine noun, ending in इ *i*

पानि *páni*,* water.

SINGULAR एकवचन *Ek'vachan.*

Nom.	पानि *páni*, water.	
Acc.	पानि *páni*, water,	water.
	पानि कें *páni kē*,	
Inst.	पानिएँ *pániē*,	by water.
	पानि सँ *páni sā*,	
Dat.	पानि कें *páni kē*, to water.	
Abl.	पानि सँ *páni sā*, from water.	
Gen.	पानिक *pánik*,	of water.
	पानिकेर *pániker*,	
Loc.	पानि में *páni mē*, in water.	
Voc.	हे पानि *he páni*, O water.	

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* The *i* in the termination of this word is pronounced.

PLURAL बहुवचन *Bahuvachan.*

Nom.	पानि सभ *páni sabh*,	waters.
Acc.	पानि सभ *páni sabh*, पानि सभ कें *páni sabh kē*,	waters.
Inst.	पानि सभें *páni sabhē*, पानि सभ सँ *páni sabh sā̃*,	by waters.
Dat.	पानि सभ कें *páni sabh kē*,	to waters.
Abl.	पानि सभ सँ *páni sabh sā̃*,	from waters.
Gen.	पानि सभक *páni sabhak*, पानि सभकेर *páni sabh'ker*,	of waters.
Loc.	पानि सभ में *páni sabh mē*,	in waters.
Voc.	हे पानि सभ *he páni sabh*,	O waters.

§ 34. (2) Example of a feminine noun ending in इ *i*.

नेनी *není*, a girl.

SINGULAR एकवचन *Ek'vachan.*

Nom.	नेनी *není*,	a girl.
Acc.	नेनी *není*, नेनी कें *není kē*,	a girl.
Inst.	नेनिएँ *neniē*, नेनी सँ *není sā̃*,	by a girl.
Dat.	नेनी कें *není kē*,	to a girl.
Abl.	नेनी सँ *není sā̃*,	from a girl.
Gen.	नेनीक *nenίk*, नेनीकेर *neníker*,	of a girl.
Loc.	नेनी में *není mē*,	in a girl.
Voc.	गै नेनिआ *gai neniá*,	O girl.

PLURAL बहुवचन *Bahuvachan.*

Nom.	नेनी सभ *není sabh*,	girls.
Acc.	नेनी सभ *není sabh*, नेनी सभ कें *není sabh kẽ*,	girls.
Inst.	नेनी सभें *není sabhẽ*, नेनी सभ सँ *není sabh sã*,	by girls.
Dat.	नेनी सभ कें *není sabh kẽ*,	to girls.
Abl.	नेनी सभ सँ *není sabh sã*,	from girls.
Gen.	नेनी सभक *není sabhak*, नेनी सभकेर *není sabh'ker*,	of girls.
Loc.	नेनी सभ में *není sabh mẽ*,	in girls.
Voc.	गै नेनिआ सभ *gai neniá sabh*,	O girls.

§ 35. (3) Example of a masculine proper noun ending in ऊ *ú*.

रघू* *Raghú* a proper noun.

Nom.	रघू *Raghú*,	Raghú.
Acc.	रघू कें *Raghú kẽ*,	Raghú.
Inst.	रघुएँ *Raghuẽ*, रघू सँ *Raghú sã*,	by Raghú.
Dat.	रघू कें *Raghú kẽ*,	to Raghú.
Abl.	रघू सँ *Raghú sã*,	from Raghú.
Gen.	रघूक *Raghúk*,	of Raghú.
Loc.	रघू में *Raghú mẽ*,	in Raghú
Voc.	रौ रघुआ *rau Raghuá*,	O Raghú *(or respectfully)* हा रघू *hau Raghú.*

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* Usualy spelt thus in Maithili.

CHAPTER V.

ADJECTIVES गुणवाचक *Guṇaváchak.*

§ 36. The Maithil adjective is not declined. It sometimes is liable however to a change on account of gender.

§ 37. As the rules for the formation of the feminine of adjectives are the same as those for the formation of the feminine of substantives, it will be convenient to treat the whole subject of gender at the present opportunity.

I must, however, preface my remarks by confessing that this will be found, I fear, to be the most incomplete part of this grammar. As a matter of fact the distinction of gender is observed but loosely: except to paṇḍits grammatical gender, as distinct from natural gender, is almost unknown; that is to say, adjectives only become feminine when applied to female living creatures, and hence I have found considerable difficulty in collecting sufficient examples to warrant me in forming general rules.

§ 38. It is a well known fact that in High Hindí the adjectives which are derived from the *prákṛit* stock of the language, and which end in आ *á* are in reality the only ones in that language which are affected by gender. Adjectives imported direct from the Saṃskṛit, and forming their feminines after the model of that language, do not form part of the living spoken stock of the Hindí dialect, but belong rather to the dead language of the books. The same is only partly true in Maithilí. In this language we find not only *prákṛit* but even some Saṃskṛit adjectives forming feminines distinctly the property of the language in which they have been adopted.

§ 39. The genitival terminations of High Hindí, का *ká*, के *ke*, and की *kí* evidently correspond to the *prákṛit* derived adjectives ending in ०आ-*á*, ०ए-*e*, and ०ई-*í*. In fact the genitive of a substantive may be considered as, and is liable to the same changes as, a *prákṛit* derived adjective in ०आ-*á*, ०ए-*e*,and ०ई-*í*.

§ 40. Without wishing it to be supposed that Maithilí is in any way whatever *derived* from High Hindí, it may be taken as a general rule that wherever a *prákṛit* derived word occurs both in High Hindí and in Maithilí, if that word ends in a long vowel in High Hindí, the ***usus loquendi*** of Maithilí tends to shorten that vowel. Thus we have

High Hindí.	*Maithilí.*
पानी *pání.*	पानि *páni*, water.
पानी का *pání ká.*	पानिक *páni k(a)* of water.
बड़ा *baṛá.*	बड़ *baṛ (a)* great.

The above rule is not universal, for we have in Maithilí words like नेना *nená* a boy, नेनी *není* a girl, बेटा *betá* a son, and बेटी *betí* a daughter; but it is nearly so, and may be taken as general.

§ 41. It may be therefore remembered that what corresponds to the *prákṛit* derived termination °आ-*á* in High Hindí, is the *prákṛit* derived termination °अ-*a* in Maithilí; both corresponding to the *prákṛit* nominative in °ओ-*o*, and both apparently derived from it.

§ 42. Similarly prákṛit derived nouns, adjectives, and genitives in High Hindí ending in °आ-*á*, form their feminines by changing this °आ-*á* into °ई-*í*, while prákṛit derived nouns and adjectives in Maithilí ending in °अ-*a*, form their feminines by changing the °अ-*a* into °इ-*i*. This rule does not, be it observed, apply to the genitive in Maithilí, which has lost all trace of its former adjectival form. That the termination of the genitive °क-*k* (*a*) was originally an adjective, and derived from the Saṃskṛit कृत *kṛita*, through the prákṛit केरक *keraka* or केलक *kelaka* as suggested by Mr. Hoernle cannot I think admit of a doubt; for we have even at the present day the form °केर -*ker* used alongside of °क-*ka*, and a study of the older Maithilí poems, shows that the former termination is the more ancient, and has only been supplanted by, or contracted into the latter in comparatively modern times.

§ 43. To return, however to the subject of gender, the first rule to be observed is that in Maithilí, ***Prákṛit-derived words ending in short*** °अ-*a*, ***form their feminine in short*** °इ-*i*.

Examples:

Masc.	*Fem.*
गोर *gor* fair	गोरि *gor'*.
बड़ *bar* great	बड़ि *bar'*.
बुधिआर *budhiár* wise	बुधिआरि *budhiár'*

Note.—गोर *gor* also has an irregular feminine गोरिआ *goriá*.

§ 44. The second rule is peculiar to Maithilí, and is as follows. ***Many pure Saṃskṛit words ending in*** °अ-*a*, ***adopted unaltered in Maithilí, form their feminines in short*** °इ-*i*; ***and that, whether in Saṃskṛit these words form their feminines in long*** °ई-*í* ***or not.***

Examples:

	Masc.	*Fem.*
Saṃskrit	सुन्दर *sundar* beautiful	सुन्दरी *sundarí*.
Maithilí		सुन्दरि *sundar'*.
S.	धूसर *dhúsar* dusty	धूसरा *dhúsará*. or धूसरी *dhúsarí*.
M.		धूसरि *dhusar'*.
S.	अत्यंत *atyant* excessive	अत्यंता *atyantá*.
M.		अत्यंति *atyant'*.

The following may here be noted as irregular:

	Masc.	*Fem.*
S. M.	**सुबोध** *subodh* wise	**सुबोधा** *subodhá.* **सुबुधि** *subudh'.*

§ 45. Rule III. *A few prákṛit-derived words ending in* ॰आ-*á, form their feminines in* ॰ई-*í.*

Examples:

Masc.	*Fem.*
बेटा *beṭá* a son	बेटी *beṭi* a daughter.
नेना *nená* a boy	नेनी *neni* a girl.

§ 46. Rule IV. *Prákṛit-derived words signifying colour form their feminines as follows:*

Masc.		*Fem.*
उजर *ujar* or उजरा *uj'rá* or उजरका *ujar'ká*	white	उजरी *uj'ri* or उजरकी *ujar'ki.*
कारी *kári* or करिआ *kariá* or करिक्का *karikká*	black	करिक्की *karikki.*
पीरा *pirá* or पीअर *piar* or पिअरका *piar'ká*	yellow	पिअरकी *piar'kí.*
हरिअर *hariar* or हरिअरका *hariar'ká*	green	हरिअरकी *hariar'ki.*

Masc.		*Fem.*
लाल *lál* or ललका *lal'ká*	red	ललकी *lal'kí.*

EXCEPTION,—गेार *gor* fair, which makes गेारि *gor'*, or गेारिया *goriá*.

Note also that नील *níl*, dark blue, which is adopted direct from the Saṃskṛit and which in that language forms its feminine नीला *nílá*, or नीली *nilí*, in Maithilí adopts नीली *nílí* as its feminine form.

§ 47. RULE V. The following classes of words, adopted directly from Saṃskṛit, form their feminines generally as in that language.

a. Verbal adjectives in °इ-*i*, and °ई-*í*, corresponding to Saṃskṛit adjectives in इन् *in*.

Examples :

	Masc.		*Fem.*
S.	मानिन् *mánin*	proud	मानिनी *mánini*
M.	मानि *máni*		or मानिनि *mánin'*.
S.	भाविन् *bhávin*	future	भाविनी *bhávini*
M.	भावी *bhaví*		or भाविनि *bhávin'*.
S.	हारिन् *hárin*	seizing	हारिणी *hárini*
M.	हारी *hárí*		or हारिनि *harin'*.
S.	धारिन् *dhárin*	bearing	धारिणी *dhárini*
M.	धारी *dhárí*		or धारिनि *dhárin'*.
S.	कारिन् *kárin*	doing	कारिणी *káriṇí*
M.	कारी *kárí*		or कारिनि *kárin'*.
S.	चिरंजीविन् *chirañjívin*	long-lived	चिरँजीवि *chirañjíb'* or
M.	चिरंजीवी *chirañjíbí*		चिरँजीविनी *chirañjíbiní*.
or	चिरंजिव *chirañjib*		or चिरँजीविनि *chirañjíbin'*,

As an irregular under this head falls,—

	Masc.		*Fem.*
S.	सुधर्मन् *sudharman*	virtuous	सुधर्मा *sudharmá.*
M.	सुधर्मा *sudharmá*		सुधर्मिणी *sudharminí.*

§ 48. *(b)* Participles of the Reduplicated perfect in °वस्-*vas*, and comparatives in °ईयस्-*íyas.*

Examples:

	Masc.		*Fem.*
S.	विद्वस् (विद्वान्) *vidvas, (vidván)*	wise	विदुषी *vidushí.*
M.	विद्वान् *vidván*		
S.	गरीयस् *garíyas*	heavier	गरीयसी *garíyasí.*
M.	गरीयान् *garián*		
S.	लघीयस् *laghíyas*	lighter	लघीयसी *laghíyasí.*
M.	लघीयान् *laghián*		

§ 49. *(c)* *Nomina agentis* terminating in °अक *ak(a).*

Examples:

Masc.		*Fem.*
कारक *kárak*	a doer	कारिका *káriká.*
पालक *pálak*	a protector	पालिका *páliká.*
रक्षक *rakshak*	a guardian	रक्षिका *rakshiká.*
पाचक *páchak*	a cook	पाचिका *páchiká.*
सहायक *saháyak*	a helper	सहायका *saháyaká.*

§ 50. *(d)* Gerundials and past participles passive.

Examples:

Masc.		*Fem.*
मंतव्य *mantaby*	to be remarked	मंतव्या *mantabyá.*
बंदनीय् *bandaníy*	praiseworthy	बंदनीया *bandaníyá.*
योग्य *jogy*	worthy	योग्या *jogyá.*
मान्य *mány*	reverend	मान्या *máná.*
साध्य *sádhy*	easy	साध्या *sádhyá.*

Masc.		*Fem.*
युक्त *jukt*	joined	युक्ता *juktá.*
सुद्ध (शुद्ध) *suddh (śuddh)*	pure	सुद्धा *suddhá.*
आर्त *árt*	pained	आर्ता *ártá.*
खिन्न *khinn*	broken	खिन्ना *khinná.*

§ 51. *(e)* Other nouns and adjectives as,—

Masc.		*Fem.*
धूर्त *dhúrt*	a knave	धूर्ता *dhúrtá.*
श्याम *śyám*	dark	श्यामा *śyámá.*
गरिष्ठ *garishth*	heaviest (venerable)	गरिष्ठा *garishthá.*
श्रेष्ठ *śreshth*	excellent.	श्रेष्ठा *śreshthá.*
वृंद *vṛind*	numerous	वृंदा *vṛindá.*
आर्य्य *árjy*	respectable	आर्य्या *árjyá.*

§ 52. Rule VI. The following anomalous forms should be noticed.

(a) राजा *rájá*, a king, makes रानी *rání* a queen.

(b) Forms borrowed from Saṃskṛit *nomina agentis* in °तृ *tṛi* present some curious anomalies.

Examples.

	Masc.		*Fem.*
S.	धातृ *dhátṛi*	creator	धात्री *dhátrí.*
M.	धाता *dhátá*		धातृ *dhátṛi.*
S.	ज्ञातृ *jńátṛi*	knower	ज्ञात्री *jńátrí.*
M.	ज्ञाता *jńátá*		ज्ञातृ *jńátṛi.*
S.	पातृ *pátṛi*	protector	पात्री *pátrí.*
M.	पाता *pátá*		पातृ *pátṛi.*

Comparison of Adjectives.

§ 53. *(a) Comparative.* As in High Hindí, the comparative is formed, not by any change in the adjective, but by putting the word for the thing with which the comparison is made in the ablative case. Example, इ गाछी ओहि गाछी सँ सुंदर छैक *i gáchhí oh' gáchhí sã sundar chhaik.* "This grove is more beautiful than that."

§ 54. (*b*) *Superlative.* This is formed either by prefixing सभ सँ *sabh sã*, the ablative case of सभ *sabh all*, or the adjective बड़ *baṛ* (which is liable to inflection according to gender) to the principal adjective. Examples; इ गाछी सभ सँ सुंदर छैक *i gáchhí sabh sã sundar chhaik* "this is the most beautiful grove;" or इ गाछी बड़ सुंदर छैक *i gáchhí baṛ sundar chhaik* "this grove is very beautiful."

§ 55. Certain comparatives and superlatives are also borrowed direct from the Saṃskṛit, which need not be noted here.

CHAPTER VI.

PRONOUNS सर्वनाम *Sarvanám.*

§ 56. The declension of Pronouns presents some important points of difference from that of nouns, which must be carefully noticed.

§ 57. While nouns remain unchanged before postpositions, pronouns always change to some other form. They have an inflected base which is different from the nominative, and which is used before all postpositions.

§ 58. The accusative singular of pronouns is never the same as the nominative. The pronoun of the second person अपने *ap'ne* or अहाँ *aháñ*, and the interrogative adjectival pronoun की *kí, what?* are the only exceptions to this rule. In circumstances corresponding to those in which the accusative of a noun takes the nominative form, the accusative of a pronoun takes the form of the inflected base without any postposition.

The genitive form of pronouns in र *r* is also to be noticed.

In pronouns not only the accusative, but also the dative, is allowed to drop the postposition कें *kẽ*.

§ 59. Pronouns have the same form whether referring to masculine or feminine nouns. They are declined throughout in the singular and plural numbers.

§ 60. With the exception of the pronouns of the second person, they all want the vocative case.

PERSONAL PRONOUNS.

पुरुषवाचक सर्वनाम *purush'váchak sarvanám.*

§ 61. There are three sets of personal pronouns, the first set referring to the first person, the second to the second person, and the third to the third. Each of the two last sets consists of two divisions—an honorific, and a non-honorific division. In other words, the pronouns of the second and third persons have each two forms, an honorific and a non-honorific form.

§ 62. To people accustomed to deal with eastern languages, I need do no more than point out the fact, except to notice *en passant*, that in no Indian language which I have studied, is this distinction carried to a greater length* than in Maithilí.

§ 63. The following are the personal pronouns in use at the present day :—

		Direct Form.	*Oblique Form.*
1st Person	Honorific	हम *ham*	हमरा *ham'rá*
	Non-honorific	हम *ham*	हमरा *ham'rá*
2nd Person	Honorific	अपने *ap'ne* or अहाँ *ahā̃*	अपने *ap'ne* or अहाँ *ahā̃*
	Non-honorific	तोँह *tōh*	तोहरा *tohará*
3rd Person	Honorific	ओ *o*	हुनका *hun'ká*
	Non-honorific	ओ *o*	ओकरा *okará*

I now proceed without further premise to give their declension.

FIRST PERSON, उत्तम पुरुष *uttam purush.*

§ 64. हम *ham*, I.

SINGULAR.

Nom.	हम *ham*, I.	
Acc.	हमरा *ham'rá*, हमरा केँ *ham'rá kẽ*,	me.
Inst.	हमरेँ *ham'rẽ*, हमरा सँ *ham'rá sã*,	by me.

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* It will be seen further on, that some verbs have not only a honorific and a non-honorific form depending on the subject, but have also another pair of honorific and non-honorific forms depending on the object.

SINGULAR.

Dat.	हमरा *ham'rá*, हमरा कें *ham'rá kẽ*,	to me.
Abl.	हमरा सँ *ham'rá sã*,	from me.
Gen.	हमर *hamar*, or हमार *hamár*,	of me, my.
Loc.	हमरा में *ham'rá mẽ*,	in me.

PLURAL.

Nom.	हम सभ *ham sabh*,* हमरा सभ, सबहि, लोकनि *ham'rá sabh*, or *sabah'*, or *lokani*,	we.
Acc.	हमरा सभ कें, सबहि कें, लोकनि कें *ham'rá sabh kẽ*, or *sabah' kẽ*, or *lokani kẽ*,	us.
Inst.	हमरा सभें, सबहिएँ, लोकनिएँ, *ham'rá sabhẽ*, or *sab'hiẽ*, or *lok'niẽ*, हमरा सभ सँ, सबहि सँ, लोकनि सँ *ham'rá sabh sã*, or *sabah' sã*, or *lokani sã*,	by us.
Dat.	हमरा सभ कें, सबहि कें, लोकनि कें *ham'rá sabh kẽ*, or *sabah' kẽ*, or *lokani kẽ*,	to us.
Abl.	हमरा सभ सँ, सबहि सँ, लोकनि सँ *ham'rá sabh sã*, or *sabah' sã*, or *lokani sã*,	from us.
Gen.	हमरा सभक, सबहिक, लोकनिक *ham'rá sabhak*, or *sab'hik*, or *lokanik*,	of us, our.
Loc.	हमरा सभ में, सबहि में, लोकनि में *ham'rá sabh mẽ*, or *sabah' mẽ*, or *lokani mẽ*,	in us.

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*हम सबहि ***ham sabah'***, and हम लोकनि ***ham lokani*** are not used.

§ 65. मेँ *mē*, I.

The following forms are used in poetry :—

SINGULAR.

Nom.	मेँ *mē*,	I.
Acc.	मोहि *moh'*,	me.
Inst.	मोहि सोँ *moh' sō*,	by me.
Dat.	मोहि *moh'*,	to me.
Abl.	मोहि सोँ *moh' sō*,	from me.
Gen.	मोर, मोरा *mor*, or *morá*,	of me, my.
Loc.	मोहि मोँ *moh' mō*,	in me.

The plural forms are not used. When necessary, the plural forms of हम *ham* are substituted. This, however, occurs but seldom.

SECOND PERSON मध्यम पुरुष *madhyam purush.*

§ 66. तोँह *tōh*, thou.

SINGULAR.

Nom.	तोँह *tōh*, तोँ *tō*,	thou.
Acc.	तोहरा *tohará*, तोहरा केँ *tohará kē*,	thee.
Inst.	तोहरेँ *toharē*, तोहरा सँ *tohará sã*,	by thee.
Dat.	तोहरा *tohará*, तोहरा केँ *tohará kē*,	to thee.
Abl.	तोहरा सं *tohará sã*,	from thee.
Gen.	तोहर *tohar*,	of thee, thy.
Loc.	तोहरा मेँ *tohará mē*,	in thee.
Voc.	हौ तोँह *hau tōh*,	O thou.

PLURAL.

Nom.	*तोँह सभ, तोँ सभ *tōh sabh*, or *tō sabh*, तोहरा सभ, सबहि, लोकनि *tohará sabh*, *sabah'*, or *lokani*,	you, ye.
Acc.	तोहरा सभ केँ, सबहि केँ, लोकनि केँ *tohará sabh kē*, *sabah' kē* or *lokani kē*,	you, ye.
Inst.	तोहरा सभेँ, सबहिएँ, लोकनिएँ *tohará sabhē* or *sab'hiē* or *lokaniē*, तोहरा सभ सँ, सबहि सँ, लोकनि सँ *tohará sabh sā*, *sabah' sā*, or *lokani sā*,	by you.
Dat.	तोहरा सभ केँ, सबहि केँ, लोकनि केँ *tohará sabh kē*, *sabah' kē* or *lokani kē*,	to you.
Abl.	तोहरा सभ सँ, सबहि सँ, लोकनि सँ *tohará sabh sā*, *sabah' sā*, or *lokani sā*,	from you.
Gen.	तोहरा सभक, सबहिक, लोकनिक *tohará sabhak*, *sab'hik*, or *lokanik*,	of you, your.
Loc.	तोहरा सभ मेँ, सबहि मेँ, लोकनि मेँ *tohará sabh mē*, *sabah' mē*, *lokani mē*,	in you.
Voc.	हौ तोँह सभ *hau tōh sabh*, हौ तोहरा सभ, सबहि, लोकनि *hau tohará sabh*, *sabah'* or *lokani*,	O ye.

N.B.—For तोहरा *tohará*, तोहरेँ *toharē*, and तोहर *tohar*, तोरा *torá*, तोरेँ *torē*, and तोर *tor* are used by the vulgar.

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* तोँह सबहि *tōh sabah'*, and तोँह लोकनि *tōh lokani* are not used.

§ 67. तोँ *tō*, thou.

The following are used in poetry :—

SINGULAR.

Nom. तोँ *tō*, thou.

Acc. तोहि *toh'*, *thee*.

Inst. तोहि सोँ *toh' sō*, by thee.

Dat. तोहि *toh'*, to thee.

Abl. तोहि सोँ *toh' sō*, from thee.

Gen. तुअ, तोर, तोहर, तोहार *tua*, *tor*, *tohar*, or *tohár*, of thee, thy.

Loc. तोहि मोँ *toh' mō*, in thee.

The plural forms are not used. When necessary, the plural forms of तोँह *tōh* are substituted. This, however, occurs but seldom.

SECOND PERSON RESPECTFUL.

§ 68. अहाँ *ahā'*, thou.

SINGULAR.

Nom. अहाँ, अपने *ahā'*, or *ap'ne*, thou.

Acc. अहाँ केँ, अपने केँ *ahā' kē*, or *ap'ne kē*, thee.

Inst. अहैँ, अहाँ सँ, अपने सँ *ahāi*, *ahā' sā*, or *ap'ne sā*, by thee.

Dat. अहाँ केँ, अपने केँ *ahā' kē*, or *ap'ne kē*, to thee, thy.

Abl. अहाँ सँ, अपने सँ *ahā' sā*, or *ap'ne sā*, from thee.

Gen. अहाँक, अपनेक *ahā'k*, *ap'nek*, of thee.

Loc. अहाँ मेँ, अपने मेँ *ahā' mē*, *ap'ne mē*, in thee.

Voc. औ अहाँ *au ahā'*, O thou.

Plural.

Nom.	अहाँ सभ, सबहि, लोकनि *ahā̃ sabh, sabah'*, or *lokani*, अपने सभ, सबहि, लोकनि *ap'ne sabh, sabah'*, or *lokani*,	you, ye.
Acc.	अहाँ सभ कें, सबहि कें, लोकनि कें *ahā̃ sabh kē̃, sabah' kē̃*, or *lokani kē̃*, अपने सभकें, सबहि कें, लोकनि कें *ap'ne sabh kē̃, sabah' kē̃*, or *lokani kē̃*,	you, ye.
Inst.	अहाँ सभ सँ, अहैं सभ सँ, अपने सभ सँ, सबहि सँ, लोकनि सँ *ahā̃ sabh sā̃, ahāi sabh sā̃, ap'ne sabh sā̃, sabah' sā̃*, or *lokani sā̃*,	by you
Dat.	अहाँ सभ कें, अपने सभ कें, सबहि कें, लोकनि कें *ahā̃ sabh kē̃, ap'ne sabh kē̃, sabah' kē̃, lokani kē̃*,	to you.
Abl.	अहाँ सभ सँ, अपने सभ सँ, सबहि सँ, लोकनि सँ *ahā̃ sabh sā̃, ap'ne sabh sā̃, sabah' sā̃*, or *lokani sā̃*,	from you.
Gen.	अहाँ सभक, अपने सभक, सबहिक, लोकनिक *ahā̃ sabhak, ap'ne sabhak, sab'hik*, or *lokanik*,	of you.
Loc.	अहाँ सभ में, अपने सभ में, सबहि में, लोकनि में *ahā̃ sabh mē̃, ap'ne sabh mē̃, sabah' mē̃* or *lokani mē̃*,	in you.

N.B.—अपने *ap'ne* can be used throughout for अहाँ *ahā̃*. It is the more honorific term of the two. अहाँ *ahā̃* is sometimes even used when talking to inferiors. अहाँ *ahā̃*, in fact, is *polite*, and तोँह *tõh* is *vulgar*.

Reflexive Pronoun.

अपनहिँ *ap'nah'ñ*, self.

§ 69.

Singular.

Nom.	अपनहिँ *ap'nah'ñ*, self.
Acc.	अपना कें *ap'ná kẽ*, self.
Inst.	अपना सं, अपनहिँ सँ *ap'ná sã*, or *ap'nah'ñ sã*, by self.
Dat.	अपना कें *ap'ná kẽ*, to self.
Abl.	अपना सं, अपनहिं सं *ap'ná sã*, or *ap'nah'ñ sã*, from self.
Gen.	अपन *apan*, अप्पन *appan*, of self.
Loc.	अपना में *ap'ná mẽ*, in self.

Plural.

Nom.	अपनहिँ सभ, सवहि, लोकनि *ap'nah'ñ sabh*, *sabah'*, or *lokani*,	selves.
Acc.	अपना सभ कें, सवहि कें, लोकनिँ कें *ap'ná sabh kẽ*, *sabah' kẽ*, or *lokani kẽ*,	selves.
Inst.	अपना सभ सँ, सवहि सं, लोकनि सँ *ap'ná sabh sã*, *sabah' sã*, or *lokani sã*,	by selves.
Dat.	अपना सभ कें, सवहि कें, लोकनि कें *ap'ná sabh kẽ*, *sabah' kẽ*, or *lokani kẽ*,	to selves.
Abl.	अपना सभ सँ, सवहि सँ, लोकनि सँ *ap'ná sabh sã*, *sabah' sã* or *lokani sã*,	from selves.
Gen.	अपना सभक, सवहिक, लोकनिक *ap'ná sabhak*, *sabahik*, or *lokanik*,	of selves.
Loc.	अपना सभ में, सवहि में, लोकनि में *ap'ná sabh mẽ*, *sabah' mẽ*, or *lokani mẽ*,	in selves.

THIRD PERSON अन्यपुरुष *anya purush.*

PROXIMATE DEMONSTRATIVE NON-HONORIFIC.

§ 70. इ *i* or ई *í*, this ; not used as an adjective, and only used when referring to animate objects.

SINGULAR.

Nom.	इ *i* or ई *í*, this.
Acc.	एकरा, एकरा केँ *ekará*, or *ekará kē*, this.
Inst.	एकरेँ *ekarē*, एकरा सँ *ekará sā*, by this.
Dat.	एकरा, एकरा केँ *ekará*, *ekará kē*, to this.
Abl.	एकरा सँ *ekará sā*, from this.
Gen.	एकर *ekar*, of this.
Loc.	एकरा मेँ *ekará mē*, in this.

PLURAL.

Nom.	इ or ई सभ, सबहि, लोकनि *i* or *í sabh*, *sabah'*, or *lokani*, these.
Acc.	एकरा सभ केँ, सबहि केँ लोकनि केँ, *ekará sabh kē*, *sabah' kē*, or *lokani kē*, these.
Inst.	एकरा सभेँ, सबहिएँ, लोकनिएँ *ekará sabhē*, *sab'hiē*, or *lok'niē*, एकरा सभ सं, सबहि सँ, लोकनि सँ *ekará sabh sā*, *sabah' sā* or *lokani sā*, by these.
Dat.	एकरा सभ केँ, सबहि केँ, लोकनि केँ *ekará sabh kē*, *sabah' kē*, or *lokani kē*, to these.

PLURAL.

Abl. एकरा सभ सँ, सबहि सँ, लोकनि सँ *ekará sabh sã*, *sabah' sã*, or *lokani sã*, from these.

Gen. एकरा सभक, सबहिक, लोकनिक *ekará sabhak*, *sab'hik*, or *lokanik*, of these.

Loc. एकरा सभ में, सबहि में, लोकनि में *ekará sabh mē*, *sabah' mē*, or *lokani mē*, in these.

PROXIMATE DEMONSTRATIVE HONORIFIC.

SINGULAR.

§ 71.

Nom. इ or ई, *i* or *ī*, this.

Acc. हिनका, हिनका कों *hin'ká*, or *hin'ká kē*, this.

Inst. हिनका सँ *hin'ká sã*, by this.

Dat. हिनका, हिनका कों *hin'ká*, or *hin'ká kē*, to this.

Abl. हिनका सँ *hin'ká sã*, from this.

Gen. हिनक *hinak*, हिनकर *hin'kar*, of this.

Loc. हिनका में *hinká mē*, in this.

PLURAL.

Nom. इ or ई सभ, सबहि, लोकनि *i* or *ī sabh*, *sabah'*, or *lokani*, these.

Acc. हिनका सभ कों, सबहि कों, लोकनि कों *hin'ka sabh kē*, *sabah' kē*, or *lokani kē.* these.

PLURAL.

Inst.	हिनका सभ सँ, सबहि सँ, लोकनि सँ *hin'ká sabh sã*, *sabah' sã*, or *lokani sã*,	by these.
Dat.	हिनका सभ केँ, सबहि केँ, लोकनि केँ *hin'ká sabh kẽ*, *sabah' kẽ*, or *lokani kẽ*,	to these.
Abl.	हिनका सभ सँ, सबहि सँ, लोकनि सँ *hin'ká sabh sã*, *sabah' sã*, or *lokani sã*,	from these.
Gen.	हिनका सभक, सबहिक, लोकनिक *hin'ká sabhak*, *sab'hik*, or *lokanik*,	of these.
Loc.	हिनका सभ मेँ, सबहि मेँ, लोकनि मेँ *hin'ká sabh mẽ*, *sabah' mẽ*, or *lokani mẽ*,	in these.

THIRD PERSON अन्यपुरुष *anya purush*.

REMOTE DEMONSTRATIVE NON-HONORIFIC.

§ 72. ओ *o*, he, she, it, that, not used as an adjective, and only used when referring to animate objects.

SINGULAR.

Nom. ओ *o*, he, she, it, that.

Acc. ओकरा, ओकरा केँ *okará*, or *okará kẽ*, him, etc.

Inst. ओकरा सँ* *okará sã*, by him, etc.

Dat. ओकरा, ओकरा केँ *okará*, or *okará kẽ*, to him, etc.

Abl. ओकरा सँ *okará sã*, from him, etc.

Gen. ओकर *okar*, of him, etc.

Loc. ओकरा मेँ *okará mẽ*, in him, etc.

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* The form ओकरेँ *okarẽ*, is wanting.

PLURAL.

Nom. ओ सभ, सबहि, लोकनि *o sabh*, *sabah'*, or *lokani*, they, those.
Acc. ओकरा सभ कें, *etc. okará sabh kẽ*, etc., them, etc.
Inst. ओकरा सभ सँ, *etc. okará sabh sã*, etc., by them, etc.
Dat. ओकरा सभ कें, *etc. okará sabh kẽ*, etc., to them, etc.
Abl. ओकरा सभ सँ, *etc. okará sabh sã*, etc., from them, etc.
Gen. ओकरा सभक, *etc. okará sabhak*, etc., of them, their, etc.
Loc. ओकरा सभ में, *etc. okará sabh mẽ*, etc., in them, etc.

REMOTE DEMONSTRATIVE HONORIFIC.

SINGULAR.

§ 73.

Nom. ओ *o*, he, she, it, that.
Acc. हुनका, हुनका कें *hun'ká*, or *hun'ká kẽ*, him, etc.
Inst. हुनका सँ *hun'ká sã*, by him, etc.
Dat. हुनका, हुनका कें *hun'ká*, or *hun'ká kẽ*, to him, etc.
Abl. हुनका सँ *hun'ká sã*, from him, etc.
Gen. हुनक, हुनकर *hunak*, *hun'kar*, of him, his, etc.
Loc. हुनका में *hun'ká mẽ*, in him, etc.

PLURAL.

Nom. ओ सभ, सबहि, लोकनि *o sabh*, *sabah'*, or *lokani*, they, those.
Acc. हुनका सभ कें, *etc. hun'ká sabh kẽ*, etc., them, etc.
Inst. हुनका सभ सँ, *etc. hun'ká sabh sã*, etc., by them, etc.
Dat. हुनका सभ कें, *etc. hun'ká sabh kẽ*, etc., to them, etc.
Abl. हुनका सभ सँ, *etc. hun'ká sabh sã*, etc., from them, etc.
Gen. हुनका सभक, *etc. hun'ká sabhak*, etc., of them, their, etc.
Loc. हुनका सभ में, *etc. hun'ká sabh mẽ*, etc., in them, etc.

THE RELATIVE PRONOUN.

सम्बन्धवाचक सर्वनाम *Sambandh'váchak sarvanám.*

§ 74. Like the Personal and Demonstrative pronouns, the Relative also has two forms—one honorific, and the other non-honorific.

The same observation applies also to the correlative से *se* and to the Interrogative के *ke*, and as attention is here drawn to the fact, the remark will not be repeated.

THE RELATIVE PRONOUN, NON-HONORIFIC.

§ 75. जे *je*, who, which, that.

SINGULAR.

Nom.	जे *je*, who, which, that.
Acc.	जकरा, जकरा कें, *jakará*, or *jakará kẽ*, whom, etc.
Inst.	जकरा सँ, जाहि सँ * *jakará sã* or *jáh' sã*, by whom, etc.
Dat.	जकरा, जकरा कें *jakará* or *jakará kẽ*, to whom, etc.
Abl.	जकरा सँ, जाहि सँ *jakará sã*, or *jáh' sã*, from whom, etc.
Gen.	जकर *jakar*, of whom, whose, etc.
Loc.	जकरा में, जाहि में *jakará mẽ*, or *jáh' mẽ*, in whom, etc.

PLURAL.

Nom.	जे सभ, सबहि, लोकनि *je sabh, sabah'*, or *lokanî*,	who, which, that.
Acc.	जकरा or जाहि सभ कें † *etc., jakará* or *jáh' sabh kẽ*, etc.,	whom, etc.

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* Other forms noted are जें *jẽ* and *jakarẽ*.

† The form जाहि *jáh'* is not used throughout the singular, but only in those cases where it is specially given. In the plural it is used in all the oblique cases.

PLURAL.

Inst.	जकरा or जाहि सभ सँ, *etc. jakará* or *jáh' sabh sā*, etc.,	by whom, etc.
Dat.	जकरा or जाहि सभ केँ, *etc. jakará* or *jáh' sabh kē*, etc.,	to whom, etc.
Abl.	जकरा or जाहि सभ सँ, *etc. jakará* or *jáh' sabh sā*, etc.,	from whom, etc.
Gen.	जकरा or जाहि सभक, *etc. jakará* or *jáh' sabhak*, etc.,	whom, etc.
Loc.	जकरा or जाहि सभ मेँ, *etc. jakará* or *jáh' sabh mē*, etc.,	in whom, etc.

THE RELATIVE PRONOUN HONORIFIC.

§ 76.

SINGULAR.

Nom.	जे *je*, who, which, that.
Acc.	जनिका, जनिका केँ *janiká*, or *janiká kē*, whom, etc.
Inst.	जनिका सँ *janiká sā*, by whom, etc.
Dat.	जनिका, जनिका केँ *janika*, or *janiká kē*, to whom, etc.
Abl.	जनिका सँ *janiká sā*, from whom, etc.
Gen.	जनिक, जनिकर *janik*, *janikar*, of whom, whose, etc.
Loc.	जनिका मेँ *janiká mē*, in whom, etc.

PLURAL.

Nom. जे सभ *je sabh*, who, which, that.
Acc. जनिका सभ कें, *etc. janiká sabh kẽ*, etc., whom, etc.
Inst. जनिका सभ सँ, *etc. janiká sabh sã*, etc., by whom, etc.
Dat. जनिका सभ कें, *etc. janiká sabh kẽ*, etc., to whom, etc.
Abl. जनिका सभ सँ, *etc. janiká sabh sã*, etc., from whom, etc.
Gen. जनिका सभक, *etc. janiká sabhak*, etc., of whom, etc.
Loc. जनिका सभ में, *etc. janiká sabh mẽ*, etc., in whom, etc.

THE CORRELATIVE PRONOUN NON-HONORIFIC.

§ 77.

SINGULAR.

Nom. से *se*, he, she, that.
Acc. तकरा, तकरा कें *takará*, or *takará kẽ*, him, etc.
Inst. तकरा सँ, ताहि सँ* *takará sã*, or *táh' sã*, by him, etc.
Dat. तकरा, तकरा कें *takará* or *takará kẽ*, to him, etc.
Abl. तकरा सँ, ताहि सँ* *takará sã*, or *táh' sã*, from him, etc.
Gen. तकर *takar*, of him, his, etc.
Loc. तकरा में, ताहि में *takará mẽ*,or *táh' mẽ*, in him, etc.

PLURAL.

Nom. से सभ, सबहि, *etc. se sabh, sabah'*, etc., they, those.
Acc. तकरा or ताहि सभ कें, *etc. takará* or *táh' sabh kẽ*, etc., them, those.
Inst. तकरा or ताहि सभ सँ, *etc. takará* or *táh' sabh sã* etc., by them, by those.

---

* Other forms are तें *tẽ* and तकरें *takarẽ*.

Dat.	तकरा or ताहि सभकेँ, *etc.*	*takará* or *táh'* *sabh kẽ*, etc.,	to them, to those.
Abl.	तकरा or ताहि सभ सँ *etc.*	*takará* or *táh'* *sabh sã*, etc.,	from them, from those.
Gen.	तकरा or ताहि सभक, *etc.*	*takará* or *táh'* *sabhak*, etc.,	their, of those.
Loc.	तकरा or ताहि सभ मेँ, *etc.*	*takará* or *táh'* *sabh mẽ*, etc.,	in them, in those.

THE CORRELATIVE PRONOUN HONORIFIC.

§ 78.

SINGULAR.

Nom.	से *se*, he *or* that.
Acc.	तनिका, तनिका केँ *taniká*, or *taniká kẽ*, him, etc.
Inst.	तनिका सँ *taniká sã*, by him, etc.
Dat.	तनिका, तनिका केँ *taniká*, or *taniká kẽ*, to him, etc.
Abl.	तनिका सँ *taniká sã*, from him, etc.
Gen.	तनिक, तनिकर *tanik*, *tanikar*, of him, his, etc.
Loc.	तनिका मेँ *taniká mẽ*, in him, etc.

PLURAL.

Nom.	से सभ, सबहि, *etc.* *se sabh*, *sabah'* etc., they, those.
Acc.	तनिका सभ केँ, *etc.* *taniká sabh kẽ*, etc., them, etc.
Inst.	तनिका सभ सँ, *etc.* *taniká sabh sã*, etc., by them, etc.
Dat.	तनिका सभ केँ, *etc.* *taniká sabh kẽ*, etc., to them, etc.
Abl.	तनिका सभ सँ, *etc.* *taniká sabh sã*, etc., from them, etc.
Gen.	तनिका सभक, *etc.* *taniká sabhak*, etc., of them, their, etc.
Loc.	तनिका सभ मेँ, *etc.* *taniká sabh mẽ*, etc., in them, etc.

INTERROGATIVE PRONOUN NON-HONORIFIC.

प्रश्नवाचक सर्वनाम *praśnaváchak sarvanám.*

§ 79. SINGULAR.

Nom. के *ke,* who? which?
Acc. ककरा, ककरा कें *kakará, kakará kẽ,* whom? which?
Inst. ककरा सँ *kakará sã,* by whom? by which?
Dat. ककरा, ककरा कें *kakará,* or *kakará kẽ,* to whom? to which?
Abl. ककरा सँ *kakará sã,* from whom? from which?
Gen. ककर *kakar,* whose?
Loc. ककरा में *kakará mẽ,* in whom? in which?

PLURAL.

Nom. के सभ, सबहि, लोकनि *ke sabh, sabah',* or *lokani,* who? which?
Acc. ककरा सभ कें *etc. kakará sabh kẽ,* etc., whom? etc.
Inst. ककरा सभ सँ, *etc. kakará sabh sã,* etc., by whom? etc.
Dat. ककरा सभ कें *etc. kakará sabh kẽ,* etc., to whom? etc.
Abl. ककरा सभ सँ *etc. kakará sabh sã,* etc., from whom? etc.
Gen. ककरा सभक *etc. kakará sabhak,* etc., whose? etc.
Loc. ककरा सभ में *etc. kakará sabh mẽ,* etc., in whom? etc.

The form काहि *káh'* which might be expected, is not used so far as my experience goes.

INTERROGATIVE PRONOUN HONORIFIC.

§ 80. SINGULAR.

Nom. के *ke,* who? which?
Acc. कनिका, कनिका कें *kaniká,* or *kaniká kẽ,* whom? etc.
Inst कनिका सँ *kanika sã,* by whom? etc.

SINGULAR.

Dat. कनिका, कनिका केँ *kaniká*, or *kaniká kẽ*, to whom? etc.
Abl. कनिका सँ *kaniká sã*, from whom? etc.
Gen. कनिक, कनिकर *kanik*, *kanikar*, whose?
Loc. कनिका मेँ *kaniká mẽ*, in whom? etc.

PLURAL.

Nom. के सभ, सबहि, लोकनि *ke sabh*, *sabah'* or *lokani*, who? which ?
Acc कनिका सभ केँ, *etc. kaniká sabh kẽ*, etc., whom? etc.
Inst. कनिका सभ सँ, *etc. kaniká sabh sã*, etc., from whom? etc.
Dat. कनिका सभ केँ *etc. kaniká sabh kẽ*, etc., to whom? etc.
Abl. कनिका सभ सँ *etc. kaniká sabh sã*, etc., from whom? etc.
Gen. कनिका सभक, *etc. kaniká sabhak*, etc., whose ? etc.
Loc. कनिका सभ मेँ, *etc. kaniká sabh mẽ*, etc., in whom? etc.

INTERROGATIVE PRONOUN (used with inanimate objects.)

§ 81. की *kí*, what. (Irregular).

SINGULAR.

Nom. की *kí*, what?
Acc. कथी केँ, की *kathí kẽ*, or *kí*, what?
Inst. कथी सँ *kathí sã*, by what?
Dat. कथी लै *kathí lai*, to or for what? why?
Abl. कथी सँ *kathí sã*, from what?
Gen. कथीक *kathík*, of what?
Loc. कथी मेँ *kathí mẽ*, in what?

Plural wanting. The singular is used instead. Note the form of the Dative.

९३ तेरानब
९४ चौरानबे
९५ पँचानबे
९६ छेआनबे
९७ सनतानबे
९८ अँठानबे
९९ निनानबे
१०० सै

ORDINALS.

§ 91. Ordinals are simple in their formation and run as follows:—

पहिल first.
दोसर second.
तेसर third
चौठ or चारिम fourth.
पाँचम fifth.
छठम sixth.
सातम seventh.
आठम eighth.
नौम ninth.
दशम tenth.
एगारहम eleventh.

Etcetera; the ordinals of the remaining numbers being formed by adding म as a termination.

FRACTIONAL NUMBERS.

§ 92. The following are useful:—

पाओ a quarter.
आध a half.
पौन three quarters; or, less by a quarter.
सवैयां one and a quarter; or, plus a quarter.
डेओढ़ा one and a half; or, plus a half.

AGGREGATE NUMBERS.

§ 93. Note the form दुनु both.

PART III.

THE VERB.

CHAPTER VIII.

PRELIMINARY.

§ 94. The *Maithil* verb delights in a redundancy of forms. Like all partially cultivated languages, it has few parts of which there are not two or three optional forms. These optional forms are not local peculiarities, but are all used by the same speaker as his fancy or as the rhythm of the sentence dictates. I cannot find out that they represent any different shades of meaning. I shall throughout the following paradigms give first the forms most commonly used, and shall then note after each tense, the optional forms which I have been able to collect.

§ 95. The Maithil verb is of three kinds—active, neuter, and passive. I shall not deal with the passive verb now but shall treat of its peculiarities in another section. The difference between active (or transitive) and neuter (or intransitive) verbs will be treated of further on in this section.

§ 96. The verb has no moods, in the sense of those which we find in Greek or Latin,—that is to say two or more moods, each with its own array of tenses. It has, it is true, a conditional, an imperative, and an infinitive form, but these have few tense forms, and it is more convenient to consider them as tenses, like the *kálas (tempora)* or tenses of Sanskrit.

§ 97. Taking them in this sense, there are nine commonly used tenses in Maithili, corresponding to the nine tenses, mentioned by Mr. Etherington, as being commonly used in Hindí ;—*viz.* 1. the Present, 2. the Imperfect, 3. the Past, 4. the Perfect, 5. the Pluperfect, 6. the Future. 7. the Retrospective Conditional, 8. the Prospective Conditional, 9. the Imperative.

§ 98. These tenses have no number, but they make up for this by having in transitive verbs each no less than twenty four personal forms, each of which has many varieties. Intransitive verbs have half that number of forms.

§ 99. In the first place, it has two genders, and hence there are twelve pairs of forms, one member of each pair being used when the subject of the verb is masculine, and the other when it is feminine.

§ 100. Again, there are three persons, the first person, the second person, and the third person, each of which is determined also by the subject of the verb. There are thus in transitive verbs four masculine and four feminine forms, and in intransitive verbs two masculine and two feminine forms (each with its varieties), for each person, and it now remains to consider these personal forms.

§ 101. I shall first deal with the four personal forms of the transitive verb. These four forms exhibit to a wonderful degree the luxuriance of the language. They depend not only on the subject, but on the object of the verb. We are accustomed, in languages like Bangálí, to meet with so called Respectful and Disrespectful forms of the verb, which are used according to the social position in the kingdom of ideas of the subject of the verb, but in Maithilí this distinction of rank is carried to a much greater length, for the form of the word is not only governed by the social position of the subject, but by that of the object. We thus have four forms of each person—

1. When the subject and object are both superior.
2. When the subject is superior, and the object inferior.
3. When the subject and object are both inferior.
4. When the subject is inferior, and the object superior.

Examples in order would be,—

1. He (a king) sees him (a king).
2. He (a king) sees him (a slave).
3. He (a slave) sees him (a king).
4. He (a slave) sees him (a slave).

In each of these sentences the word "sees" would be rendered by a different form of the verb.

§ 102. These different forms I have called as follows:—

1. Double Honorific.
2. Honorific-non-Honorific.
3. Double non-Honorific.*
4. Non-Honorific-Honorific.

The first is that form in which the subject and the object are both superior. The second is that in which the subject is superior and the object inferior. The third, that in which subject and object are both inferior; and the fourth that in which the subject is inferior, and the object superior.

§ 103. The intransitive verb has no object, and hence its form cannot be determined by the object. It has hence for each gender and person only two forms, depending only on the subject.—It prefers (but by no means universally) forms corresponding to the Honorific-non-honorific and Double non-honorific of the transitive verb. That is to say it prefers the forms which, in a transitive verb, show the object to be inferior. The Honorific form of the intransitive verb, corresponds to the Honorific non-honorific of the transitive and similarly the non-honorific, to the double non-honorific. Besides the above distinction there are some important differences of conjugation between the transitive and intransitive verb, which will be noted further on.

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* This is the general rule. Practically, however, we often find the 1st and 3rd forms used, when no special respect is attributed to the object.

§ 104. I shall commence by describing the formation of the transitive verb, as being the fuller of the two, and shall then proceed to note the points in which the intransitive verb differs from it.

§ 105. The infinitive of the verb ends in ०अब *ab*, or ०एब *eb*, and the conjugational base or root of the verb may be found by cutting off this अब *ab*, or एब *eb*, from the infinitive. Thus देखब *dekhab* is the infinitive mood, and means "to see." Cutting off अब *ab* we obtain देख् *dekh*, which is the root.

§ 106. By adding, the termination ऐत *ait* to the root we obtain the present participle. Example, देखैत *dekhait*, "seeing".

§ 107. By adding the termination ०अल *al* to the root we obtain the past participle. Example, देखल *dekhal*, " seen".

§ 108. From these four forms, the root, the present participle, and the past participle, all the tenses of a verb are formed. *viz.*—

Four from the root,

1. The Prospective Conditional or Simple Present.
2. The Future.
3. The Imperative, and
4. The Retrospective Conditional.

Two from the present participle,

1. The Present (Periphrastic), and
2. The Imperfect.

Three from the past participle,

1. The Past.
2. The Perfect.
3. The Pluperfect.

Note that in the High Hindí the Retrospective Conditional is said to be formed from the Present Participle. In Maithilí it is apparently formed from the root but the point is very doubtful.

§ 109. Before proceeding further, it is necessary to learn the conjugation of the verb personal, which is as follows.

§ 110. The verb personal is irregular in many respects, different parts being derived from three different roots, of which the infinitives are or are supposed to be.

1. छब *chhab*, to be.
2. थिकब *thikab*, to stand (?)
3. रहब *rahab*, to remain.

It is also defective, only the present and imperfect forms existing. A past participle is also borrowed from the irregular verb होएब *hoeb*, to be.

CHAPTER VIII.

THE AUXILIARY VERB.

छब *chhab &c.*, to be (not used in this form.)

§ 111.

PRESENT TENSE.

"I am" &c.

FORM I.

Used when no special respect is attributed to the object.

MASCULINE.

a. Honorific.

1st. P. **हम**, or **हमरा सभ छी** *ham*, or *ham'rá sabh chhi*,(1) I am, *or* we are.

2nd P. **आहाँ**, or **आहाँ सभ छी** *ahã'*, or *ahã' sabh chhí*,(1) you are.

3rd P. **ओ**, or **ओ सभ छथि** *o*, or *o sabh chhath'*,(1) he is, *or* they are.

(1) Optional forms of छी are छिऐ *chhiai*, and छिऐक *chhiaik*. The forms छिऔ *chhiau*, छिऔक *chhiauk* and छिअह् *chhiah'*, are also used, but only in the first person.

b. Non-Honorific.

1st. P. हम, or हमरा सभ छी *ham* or *ham'rá sabh chhi,*(1) I am, *or* we are,

2nd P. तोँह, or तोहरा सभ छह *tōh*, or *tohará sabh chah,*(2) you are.

3rd P. ओ, or ओ सभ अछि *o*, or *o sabh achh',*(4) he is *or* they are.

(1) Optional forms for छी are छिऐ *chhiai*, छिऐक *chhiaik*, छिऔ *chhiau*, छिऔक *chhiauk*, and छिअह *chhiah'*.

(2) Optional forms of छह *chhah* are छेँ *chhē*, छैँ *chhãi*, छहक *chhahak* and छहीक *chhahík*.

(4) Optional forms of अछि *achh'* are छै *chhai*, छैक *chhaik*, छौ *chhau*, and छौक *chhauk*.

FEMININE.

The feminine is the same as the masculine, except that in the 2nd Person non-Honorific, the form छहिँ *chhah'ñ* is substituted for छह *chhah*.

FORM. II.

Used when special respect is attributed to the object.

MASCULINE.

Honorific.

1st. P. हम, or हमरा सभ छिऐन्हि, *ham*, or *ham'rá sabh chhiainh'*, I am *or* we are.

2nd P. अहाँ, or अहाँ सभ छिऐन्हि *ahã*, or *ahã sabh chhiainh'*, You are.

3rd P. ओ, or ओ सभ छथुन्हि *o*, or *o sabh chhathúnh'*, he is, *or* they are.

(3) An optional form of छथुन्हि *chhathúnh'*, is छथीन्हि *chhathính'*.

Non-Honorific.

1st P. हम or हमरा सभ छिऐन्हि, *ham* or *ham'rá sabh chhiainh'*, I am, *or* we are.

2nd P. तोँह or तोहरा सभ छहून्हि *tõh,* or *tohará sabh chhahúnh',* you are.

3rd. P. ओ, or ओ सभ छैन्हि *o,* or *o sabh chhainh',* he is, or they are.

FEMININE.

The Feminine is the same as the Masculine.

§ 112. Another form of the verb substantive present is derived from the root थिक् *thik* It is conjugated as follows, personal pronouns and meaning being omitted for the sake of brevity.

FORM I.

Used when no special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st. P.	थिकहुँ *thikah'ñ,*[1]	थिकहुँ *thikah'ñ*[1]
2nd P.	थिकहुँ *thikah'ñ,*[1]	थिकाह *thikáh,*[2]
3rd P.	थिकाह *thikáh,*[3]	थिक *thik.*[4]

(1) Optional forms for थिकहुँ *thikah'ñ* are थिकिऐ *thikiaí*, and थिकिऐक *thikiaik*. The forms थिकिऔ *thikiau*, थिकिऔक *thikiauk*, and थिकिअहु *thikiah'* are also used but only in the first person.

(2) Optional forms for थिकाह *thikáh* (2nd Person non-Honorific) are थिकें *thikē*, थिकैं *thikaiñ*, थिकहक *thikahak*, and थिकहीक *thikahík*.

(4) Optional forms for थिक *thik* are थीक *thík*, थिकै *thikai*, थिकैक *thikaik*, थिकौ *thikau*, and थिकौक *thikauk*.

FEMININE.

	Honorific.	*Non-Honorific.*
1st P.	थिकहुँ *thikah'ñ,*[1]	थिकहुँ *thikah'ñ,*[1]
2nd P.	थिकहुँ *thikah'ñ,*[1]	थिकीह *thikíh,*[2]
3rd P.	थिकीह *thikíh,*[3]	थीकि *thik'.*[4]

(1) Optional forms of थिकहुँ *thikah'ñ* are already given under the masculine.

(2 & 3) An optional form of थिकीह *thikíh* is थिकीहि *thikíh'*.

(4) Optional forms of थीकि *thík'* are given under the masculine, as optional forms of थिक *thik*.

FORM II.

Used when special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	थिकिऐन्हि *thikiainh'*,[1]	थिकिऐन्हि *thikiainh'*,[1]
2nd P.	थिकिऐन्हि *thikiainh'*,[1]	थिकहून्हि *thik'húnh'*,[2]
3rd P.	थिकथून्हि *thik'thúnh'*,[3]	थिकैन्हि *thikainh'*.[4]

(3) An optional form is थिकथीन्हि *thik'thính'*.

FEMININE.

The Feminine is the same as the Masculine.

§ 113. NOTE. Wherever the persons of छी *chhí* can be used, the corresponding forms of थिकहुँ *thikah'n* can also be used. This rule is universal, and must be noted. छी *chhí* is used as an auxiliary in forming the present and perfect tenses of other verbs, and in those cases थिकहुँ *thikah'ñ* can always be substituted for it. In the verbal paradigms, I shall only give छी *chhí* as an auxiliary, but it must never be forgotten that थिकहुँ can also be used.

IMPERFECT TENSE.

§ 114. "I was" etc.

FORM I.

Used when no special respect is attributed to the object.

a. Honorific.

1st P. हम, or हमरा सभ छलहुँ *ham*, or *ham'rá sabh chhalah'ñ*,[1]
I was *or* we were.

2nd P. अहाँ, or अहाँ सभ छलहुँ *ahā̃*, or *ahā̃ sabh chhalah'ñ*,[1] you were.

3rd P. ओ, or ओ सभ छलाह *o*, or *o sabh chhaláh*[3], he was *or* they were.

(1) Optional forms of छलहुँ are छलिऐ *chhaliai*, and छलिऐक *chhaliaik*. The forms छलिऔ *chhaliau*, छलिऔक *chhaliauk* and छलिअहु *chhaliah'* are also used, but only in the 1st Person.

b. Non-Honorific.

1st P. हम, or हमरा सभ छलहुँ *ham*, or *ham'rá sabh chhalah'ñ*,[1] I was, *or* we were.

2nd P. तोँह, or तोहरा सभ छलाह *tõh*, or *tohará sabh chhaláh*,[2] you were.

3rd P. ओ, or ओ सभ छल *o*, or *o sabh chhal*,[4] he was, *or* they were.

(1) Optional forms of छलहुँ *chhalah'ñ* are given above.

(2) Optional forms of छलाह *chhaláh* are छलेँ *chhalē*, छलैँ *chhalãi*, छलहक *chhal'hak*, and छलहीक *chhal'hík*.

(3) Optional forms of छल *chhal* are छलै *chhalai*, छलैक *chhalaik*, छलौ *chhalau*, and छलौक *chhalauk*.

FEMININE.

(Personal pronouns, and meanings are omitted to save space).

	Honorific.		*Non-Honorific.*	
1st P.	छलहुँ	*chhalah'ñ*,[1]	छलहुँ	*chhalah'ñ*,[1]
2nd P.	छलहुँ	*chhalah'ñ*,[1]	छलीह	*chhalíh*,[2]
3rd P.	छलीह	*chhalíh*,[3]	छलि	*chhal'*.[4]

(1) Optional forms of छलहुँ are given above.

(2&3) An optional form of छलीह *chhalíh* is छलीहि *chhalíh'*.

(4) Optional forms of छलि *chhal'*, are given under the masculine as optional forms of छल *chhal*.

FORM II.

Used when special respect is attributed to the object.

MASCULINE.

a. Honorific.

1st P. हम, *or* हमरा सभ छलिऐन्हि *ham*, or *ham'rá sabh chhaliainh'*, I am *or* we were.

2nd P. अहाँ *or* अहाँ सभ छलिऐन्हि *ahã'*, or *ahã' sabh chhaliainh'*, you were.

3rd P. ओ *or* ओ सभ छलथून्हि *o*, or *o sabh chhal'thúnh'*.[3] He was *or* they were.

(3) An optional form of छलथून्हि *chhal'thúnh'*, is छलथीन्हि *chhal'thính.'*

b. Non-Honorific.

1st P. हम *or* हमरा सभ छलिऐन्हि[1] *ham*, or *ham'rá sabh chhaliainh'*, I was, *or* we were.

2nd P. तोँह, *or* तोहरा सभ छलहून्हि[2] *tõh*, or *tohará sabh chhal'húnh'*, You were.

3rd P. ओ, *or* ओ सभ छलैन्हि[1] *o*, or *o sabh chhalainh'*. He was, *or* they were.

FEMININE.

The Feminine is the same as the Masculine.

§ 115. Another form of the imperfect of the verb substantive is formed from the root रह *rah*. It is conjugated as follows, Personal Pronouns and meaning being omitted for the sake of brevity.

FORM I.

Used when no special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	रही *rahí*[1]	रही *rahí*,[1]
2nd P.	रही *rahí*[1]	रहह *rahah*,[2]
3rd P.	रहथि *rahath'*[3]	रहौ *rahau*.[4]

(1) Other forms are रहिऐ *rahiai*, रहिऐक *rahiaik*. The forms रहिऔ *rahiau*, रहिऔक *rahiauk* and रहिअहु *rahiah'*, are also used, but only in the first person.

(2) Other forms are रह *rah*, रहहक *rahahak*, and रहहीक *rahahík*.

The Feminine is the same as the Masculine, except that the form रहँहिँ *rahāh'n̄* is substituted for रहह *rahah* of the 2nd Person non-Honorific.

FORM II.

Used when special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	रहिऐन्हि *rahiainh'*,[1]	रहिऐन्हि *rahiainh'*,[1]
2nd P.	रहिऐन्हि *rahiainh'*,[1]	रहहून्हि *rah'húnh'*,[2]
3rd P.	रहथून्हि *rah'thúnh'*,[3]	रहैन्हि *rahainh'*.[4]

(3) Another form is रहथीन्हि *rah'thính'*.

FEMININE.

The Feminine is the same as the Masculine.

§ 116. NOTE. Wherever the persons of छलहुँ *chalah'n* can be used, the corresponding forms of रही *rahí* can also be used. This rule is universal, and must be noted. छलहुँ *chhalah'n̄* is used as an auxiliary in forming the imperfect and pluperfect tenses of other verbs, and in those cases रही *rahí* can always be substituted for it. In the verbal paradigms I shall only give छलहुँ *chhalah'n̄* as an auxiliary, but it must never be forgotten that रही *rahí* can also be used.

§ 117. The only remaining form in use is as follows :—

PAST PARTICIPLE.

Masculine, भेल *bhel*.
Feminine, भेलि *bhel'*.

CHAPTER IX.

THE TRANSITIVE VERB.

§ 118. I now proceed to give the conjugation in full of the transitive verb देखब *dekhab* to see. I shall not discuss the numerous personal terminations, for they are too many, and their origin is too obscure for me to attempt any satisfactory explanation concerning many of them. I shall first, however, as briefly as possible describe the formation of the Tense stems to which the personal terminations are attached.

§ 119. (1) Tenses formed from the Root.

a. The stem of the Prospective Conditional is the root itself unaltered, to which the personal terminations are added directly.

§ 120. *b*. The Future has two distinct stems, one formed by adding ०अब-*ab* directly to the root, and the second by adding ०अत-*at* either directly to the root, or with an intermediate ०इ-*i* (in the latter case the initial ०अ-*a* of the stem termination being omitted). We thus get देखब *dekhab*, and देखत *dekhat*, or देखित *dekhit*. To either of these stems the termination ०ग-*ga*, can optionally be suffixed. It seems to me that one of these forms is derived from the infinitive. That the future is frequently formed from infinitives is well known to students of comparative philology. Familiar examples are the Sanskrit भवितास्मि *bhavitásmi* "I am to be"[*] or "I shall be" and the French *j'aimer-ai* "I have to love", or "I shall love". In the same way we have देखबग *dekhab-ga* "I go to see", that is "I shall see." In ordinary conversation the final termination ०ग *ga* may be left out, but the above is the full form, and it is that to which we must look for a derivation.

§ 121. With respect to the stem देखित *dekhit* or देखत *dekhat*, I have no distinct suggestion to make as to its formation. It seems to be connected in some way with the present participle, but how I do not know.

§ 122. I venture to suggest one derivation of this form, which I only put forward to invite discussion, and not with any persuasion as to its truth. Is it possible that देखित *dekhit* may be connected with a low Sanskrit form of दर्शिता *darśita*, the less common form of the periphrastic future of दृश् *dṛiś* "to see"? The derivation does not seem to me to be very violent, but I have no proof to offer of it, and only put it forward as a suggestion and nothing more.

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[*] भविता "a be-er" is evidently closely connected with the infinitive भवितु' "to be".

§ 123. The stem of the Imperative is the root itself, to which the personal terminations are added direct.

§ 124. *d.* I have been in some doubt as to whether I ought to class the Retrospective Conditional as derived from the root, or from the present participle. In the cognate modern languages the corresponding tense is usually said to be derived from the latter, but I hesitate in following suit in this case, the characteristic diphthong ऐ *ai*, of the present participle being absent from the tense, except in one form of the 3rd person non-Honorific (देखैत *dekhait*). As the stem of this tense is similar in form to the second stem of the future (viz. देखित *dekhit*) I have classed it as a tense derived from the root.

§ 125. Tenses formed from the Present Participle.

a & b. Both Present and Imperfect are periphrastic; and are formed by subjoining the conjugated Present and Imperfect tenses of the auxiliary verb directly to the Present Participle.

§ 126. (3) Tenses formed from the Past Participle.

a. The stem of the past tense is formed by adding the personal terminations to the Past Participle direct.

§ 127. *b.* There are two conjugational forms of the Perfect.

The first is formed by subjoining the word अछि *achh'* " he is " to the conjugated Past tense. How any meaning is arrived at out of this queer compound I do not pretend to say.

§ 128. The second conjugational form of the Perfect is obtained by subjoining the conjugated Present tense of the verb substantive to a slightly modified form of the Past Participle.

§ 129 *c.* The Pluperfect is formed by subjoining the Imperfect tense of the verb substantive to the same modified form of the Past Participle which we observed in the Perfect.

§ 130. It will be convenient, as an aid to memory, to give the tenses in the order given in § 108, and not in order of time.

CONJUGATION OF A TRANSITIVE VERB.

ACTIVE VOICE.

Model Verb देखब *dekhab*, "to see".

PRINCIPAL PARTS.

§ 131.

Root	...	देख् *dekh*, "see."
Present participle	...	देखैत *dekhait*, "seeing".
Past participle	...	देखल *dekhal*, "seen".

1. Four tenses are formed from the root देख् *dekh*.

§ 132. *a.* THE PROSPECTIVE CONDITIONAL *or* SIMPLE PRESENT.

"(If) I see," (If) I should see," etc.*

FORM I.

Used when no special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st. P.	देखी *dekhí*,[1]	देखी *dekhí*.[1]
2nd P.	देखी *dekhí*,[1]	देखह *dekhah*,[2]
3rd P.	देखथि *dekhath'*,[3]	देखौ *dekhau*.[4]

(1) Other forms are देखिऐ *dekhiai*, देखिऐक *dekhiaik*. The forms देखिऔ *dekhiau*, देखिऔक *dekhiauk*, and देखिअहु *dekhiah,'* are also used, but only in the first person.

(2) Other forms are देख *dekh*, देखहक *dekhahak*, देखहीक *dekhahík*.

The FEMININE is conjugated like the masculine; except that in the 2nd person non-Honorific the form देखह *dekhah* is not used, the form देखँहिं *dekhāh'ñ* being used instead.

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* In poetry this tense is frequently used in the sense of the Present. It is then called the SIMPLE PRESENT in contradistinction to the PERIPHRASTIC PRESENT formed from the Present Participle.

FORM. II.

Used when special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	देखिऐन्हि *dekhiainh'*,[1]	देखिऐन्हि *dekhiainh'*,[1]
2nd P.	देखिऐन्हि *dekhiainh'*,[1]	देखहून्हि *dekh'húnh'*,[2]
3rd P.	देखथुन्हि *dekh'thúnh'*,[3]	देखौन्हि *dekhaunh'*.[4]

(1) Another form is देखिऔन्हि *dekhiaunh'*, which, however, is only used in the first person.

The FEMININE is the same as the masculine.

§ 133.

b. THE FUTURE.

"I shall or will see," etc.

FORM I.

Used when no special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	देखब *dekhab*,[1]	देखब *dekhab*,[1]
2nd P.	देखब *dekhab*,[1]	देखबह *dekh'bah*,[2]
3rd P.	देखताह *dekh'táh*,[3]	देखत *dekhat*.[4]

(1) Other forms are देखबै *dekh'bai*, देखबैक *dekh'baik*, देखतिऐ *dekh'tiai*, देखतिऐक *dekh'tiaik*, देखितहुँ *dekhitāh'n̄*, and देखिअहु *dekhiah*.' The forms देखबौ *dekh'bau*, देखबौक *dekh'bauk*, देखतिऔ *dekh'tiau*, देखतिऔक *dekh'tiauk*, देखिऔ *dekhiau*, देखिऔक *dekhiauk*, and देखीग *dekhíga*, are also used, but only in the first person.

(2) Other forms are देखबें *dekh'bē*, देखबहक *dekh'bahak*, and देखबहीक *dekh'bahík*.

(4) Other forms are देखतै *dekh'taí*, देखतैक *dekh'taik*, देखतौ *dekh'tau*, देखतौक *dekh'tauk*.

In the FEMININE the following forms are substituted.

For 2, देखबँहिँ *dekh'bãh'ñ*.

For 3, देखतीह *dekh'tíh*, or देखतिहि *dekh'tih'*.

For 4, देखति *dekhat'* instead of देखत *dekhat*. The remaining forms are common to both genders.

FORM II.

Used when special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	देखबैन्हि *dekh'bainh'*,[1]	देखबैन्हि *dekh'bainh'*,[1]
2nd P.	देखबैन्हि *dekh'bainh'*.[1]	देखबहून्हि *dekh'bahúnh'*,[2]
3rd P.	देखथून्हि *dekh'thúnh'*,[3]	देखतैन्हि *dekh'tainh'*.[4]

(3) Another form is देखथीन्हि *dekh'thính'*.

The FEMININE the same as the masculine.

NOTE. That to all the above forms, with the exception of देखीग *dekhíga*, the termination °ग-*ga*, can optionally be added. In this syllable the inherent °अ-*a*, is pronounced. E. g. देखब *dekhab*, or देखबग *dekhab'ga*.

§ 134.

THE IMPERATIVE.

"Let me see," "See thou," etc.

FOM I.

Used when no special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	देखू *dekhú*,[1]	देखू *dekhú*,[1]
2nd P.	देखू *dekhú*,[1]	देखह *dekhah*,[2]
3rd P.	देखथु *dekhath'*,[3]	देखौ *dekhau*.[4]

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* NOTE. The final °अ-*a* in this form is pronounced.

(1) Other forms are देखिए *dekhiai*, देखिऐक *dekhiaik*, and देखिअह *dekhiah'*. The forms देखिऔ *dekhiau*, and देखिऔक *dekhiauk*, are also used, but only in the first person.

(2) Other forms are देख *dekh*, देखहक *dekhahak*, and देखहीक *dekhahík*.

The FEMININE is conjugated like the masculine, except that in the 2nd person non-Honorific the form देखह *dekhah*, is not used, the form देखहिँ *dekhah'ñ* or देखाँहिँ *dekhāh'ñ* being used instead.

FORM II.

Used when special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	देखिऐन्हि *dekhiainh'*,[1]	देखिऐन्हि *dekhiainh'*,[1]
2nd P.	देखिऐन्हि *dekhiainh'*,[1]	देखहुन्हि *dekh'húnh'*,[2]
3rd P.	देखथुन्हि *dekh'thúnh'*,[3]	देखौन्हि *dekhaunh'*.[4]

(1) Another form is देखिऔन्हि *dekhiaunh'*

The FEMININE is the same as the masculine.

§ 135. *d.* THE RETROSPECTIVE CONDITIONAL.

"If I had seen," etc.

FORM I.

Used when no special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	देखितहुँ *dekhitah'ñ*,[1]	देखितहुँ *dekhitah'ñ*,[1]
2nd P.	देखितहुँ *dekhitah'ñ*,[1]	देखितह *dekhitah*,[2]
3rd P.	देखितथि *dekhitath'*,[3]	देखैत *dekhait*.[4]

(1) Other forms are देखितिऐ *dekhitiai*, and देखितिऐक *dekhitiaik*. The forms देखितिऔ *dekhitiau*, देखितिऔक *dekhitiauk*, and देखितह् *dekhitah'*, are also used, but only in the 1st Person.

(2) Other forms are देखितँ *dekhitẽ*, देतखितहक *dekhitahak*, and देखितहीक *dekhitahík*.

(4) Other forms are देखितै *dekhitai*, देखितैक *dekhitaik*, देखितौ *dekhitau* and देखितौक *dekhitauk*.

The FEMININE is conjugated like the masculine, except that, in the 2nd person non-Honorific, the form देखितह *dekhitah* is not used; the form देखितहिँ *dekhitah'ñ* or देखिताँहिँ *dekhitãh'ñ* being used instead.

FORM II.

Used when special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	देखितिऐन्हि *dekhitiainh'*,[1]	देखितिऐन्हि *dekhitiainh'*,[1]
2nd P.	देखितिऐन्हि *dekhitiainh'*,[1]	देखितहुन्हि *dekhitahúnh'*,[2]
3rd P.	देखितथुन्हि *dekhit'thúnh'*,[3]	देखितैन्हि *dekhitainh'*.[4]

(3) Another form is देखितथीन्हि *dekhit'thính'*.

The FEMININE is the same as the masculine.

§ 136.

2. Two tenses are formed from the Present Participle देखैत *dekhait*.

a. THE PRESENT.

"I see or am seeing," etc.

FORM I.

Used when no special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	देखैत छी *dekhait chhí*.[1]	देखैत छी *dekhait chhí*,[1]
2nd P.	देखैत छी *dekhait chhí*,[1]	देखैत छह *dekhait chhah*,[2]
3rd P.	देखैत छथि *dekhait chhath'*,[3]	देखैत अछि *dekhait achh'*.[4]

(1) For the auxiliary **छी** *chhí* may be used **छिऐ** *chhiai*, and **छिऐक** *chhiaik*. The forms **छिऔ** *chhiau*, **छिऔक** *chhiauk*, and **छिअह** *chhiah'*, are also used, but only in the first person.

(2) Other forms of the auxiliary are **छें** *chhẽ*, **छैं** *chhãi*, **छहक** *chhahak*, and **छहीक** *chhahík*.

(4) Other forms of the auxiliary are **छै** *chhai*, **छैक** *chhaik*, **छौ** *chhau*, and **छौक** *chhauk*.

FEMININE.

The FEMININE is conjugated like the masculine, except that the feminine form of the Present Participle, **देखैति** *dekhait'*, is used instead of the masculine form **देखैत** *dekhait*. E. g. **देखैति छी** *dekhait' chhí*, instead of **देखैत छी** *dekhait chhí*. The form **देखैति छह** *dekhait' chhah* (which might be expected as the 2nd person non-Honorific) is not used, **देखैति छहिँ** *dekhait' chhah'ñ* or **देखैति छँहि** *dekhait' chhãh'ñ* being substituted.

FORM II.

Used when special respect is attributed to the object.

MASCULINE.

Honorific.

1st P. देखैत छिऐन्हि *dekhait chhiainh'*,[1]

2nd P. देखैत छिऐन्हि *dekhait chhiainh'*,[1]

3rd P. देखैत छथुन्हि *dekhait chhathúnh'*,[3]

Non-Honorific.

1st P. देखैत छिऐन्हि *dekhait chhiainh'*,[1]

2nd P. देखैत छहुन्हि *dekhait chhahúnh'*,[2]

3rd P. देखैत छैन्हि *dekhait chhainh'*.[4]

(3) Another form of the Auxiliary is **छथीन्हि** *chhathính'*.

The **Feminine** is conjugated like the masculine, except that the feminine form of the Present Participle is used as explained above.

Observe.—In all the above forms, when masculine, the final °त-*t*, of the Present Participle may be, and usually is, omitted. The Participle and auxiliary then form one word. E. g. देखैत छी *dekhait chhí*, or देखैछी *dekhaichhí*. Similarly, when feminine, the final °ति-*t'* of the participle may be omitted. E. g. देखैति छी *dekhait' chhí*, or देखैछी *dekhaichhí*.

§ 137. *b*. THE IMPERFECT.

"I was seeing," etc.

FORM I.

Used when no special respect is attributed to the object.

MASCULINE.

Honorific.

1st P. देखैत छलहुँ *dekhait chhalah'ñ*,[1]

2nd P. देखैत छलहुँ *dekhait chhalah'ñ*,[1]

3rd P. देखैत छलाह *dekhait chhaláh*,[3]

Non-Honorific.

1st P. देखैत छलहुँ *dekhait chhalah'ñ*,[1]

2nd P. देखैत छलाह *dekhait chhaláh*,[2]

3rd P. देखैत छल *dekhait chhal*.[4]

(1) Other forms of the auxiliary छलहुँ *chhalah'ñ*, are छलिऐ *chhaliai*, and छलिऐक *chhaliaik*. The forms छलियौ *chhaliau*, छलियौक *chhaliauk*, and छलहु *chhalah'* are also used, but only in the first person.

(2) Other forms of the auxiliary are छलें *chhalē*, छलैं *chhalãi*, छलहक *chhal'hak*, छलहीक *chhal'hík*.

(4) Other forms of the auxiliary are छलै *chhalai*, छलैक *chhalaik*, छलौ *chhalau*, and छलौक *chhalauk*.

FEMININE.

As explained under the head of the present tense, the Present Participle takes the form देखैति *dekhait'* in the feminine. Also, in the feminine, the form छलीह *chhalíh*, or छलीहि *chhalíh'* is substituted for छलाह *chhaláh*, of the 3rd person Honorific, and 2nd person non-Honorific, and the form छलि *chhal'* is substituted for छल *chhal* of the 3rd person non-Honorific.

FORM II.

Used when special respect is attributed to the object.

MASCULINE.

Honorific.

1st P. देखैत छलिऐन्हि *dekhait chhaliainh'*,[1]
2nd P. देखैत छलिऐन्हि *dekhait chhaliainh'*,[1]
3rd P. देखैत छलथून्हि *dekhait chhal'thúnh'*,[3]

Non-Honorific.

1st P. देखैत छलिऐन्हि *dekhait chhaliainh'*,[1]
2nd P. देखैत छलहून्हि *dekhait chhal'húnh'*,[2]
3rd P. देखत छलैन्हि *dekhait chhalainh'*.[4]

(3) Another form of the auxiliary is छलथीन्हि *chhal'thính'*.

FEMININE.

As in the Present Tense, the present participle takes the feminine termination ॰ति-*t'*. In other respects the feminine of this form is the same as the masculine.

Observe.—As in the present tense, the masculine termination ॰त-*t*, and the feminine termination ॰ति-*t'* of the present participle may optionally be omitted. E. g. देखैत छलहुँ *dekhait chhalah'ñ* or देखैछलहुँ *dekhai-chhalah'ñ*. The latter is the more usual form.

§ 138.

3. Three tenses are formed from the Past Participle देखल *dekhal*.

a. THE PAST.

"I saw," etc.

FORM I.

Used when no special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	देखलहुँ *dekh'lah'ñ*,[1]	देखलहुँ *dekh'lah'ñ*,[1]
2nd P.	देखलहुँ *dekh'lah'ñ*,[1]	देखलह *dekh'lah*,[2]
3rd P.	देखलन्हि *dekh'lanh'*,[3]	देखलक *dekhalak*[4]

(1) Other forms are देखल *dekhal*, देखलिऐ *dekh'liai*, देखलिऐक *dekhaliaik*, देखलै *dekh'lai* देखलैक *dekh'laik*, and देखली *dekh'lí*. The forms देखलिऔ *dekh'liau*, देखलिऔक *dekh'liauk*, देखलौ *dekh'lau*, देखलौक *dekh'lauk*, and देखलिअहु *dekh'liah'* are also used, but only in the first person.

(2) Other forms are देखलेँ *dekh'lẽ*, देखलैँ *dekh'lãi*, देखलहक *dekh'lahak*, and देखलहीक *dekh'lahík*.

(4) Other forms are देखलकै *dehal'kai*, देखलकैक *dekhal'kaik*, देखलकौ *dekhal'kau*, and देखलकौक *dekhal'kauk*.

FEMININE.

The following forms are substituted :—

In (1). For देखल *dekhal*; देखलि *dekhal.'*

In (2). For देखलह *dekh'lah*; देखलिंहि *dekh'līh'*, or देखलीँहि *dekh'lī'h'*.

FORM II.

Used when special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	देखलैन्हि *dekh'lainh'*,[1]	देखलैन्हि *dekh'lainh'*,[1]
2nd P.	देखलैन्हि *dekh'lainh'*,[1]	देखलहुन्हि *dekh'lahúnh'*,[2]
3rd P.	देखलथून्हि *dekhal'thúnh'*,[3]	देखलकैन्हि *dekhal'kainh'*.[4]

(1) Another form is देखलिऐन्हि *dekh'liainh'*.
(2) Another form is देखलथीन्हि *dekhal'thính'*.

FEMININE.

The FEMININE is the same as the Masculine.

§139. *b.* THE PERFECT.

"I have seen", etc.

FIRST CONJUGATIONAL FORM.

Formed by adding the third person present non-honorific of the auxiliary verb, as a suffix to the various forms of the past.

FORM I.

Used when no special respect is attributed to the object.

MASCULINE.

Honorific.

1st P. देखलहुँ अछि *dekh'lah'n̄ achh'*,[1]
2nd P. देखलहुँ अछि *dekh'lah'n̄ achh'*,[1]
3rd P. देखलन्हि अछि *dekh'lanh' achh'*,[3]

Non-Honorific.

1st P. देखलहुँ अछि *dekh'lah'n̄ achh'*,[1]
2nd P. देखलह अछि *dekh'lah achh'*,[2]
3rd P. देखलक अछि *dekh'lak achh'*.[4]

(1) Other forms are देखल अछि *dekhal achh'*, देखलिऐ अछि *dekh'liai achh'*, देखलिऐक अछि *dekh'liaik achh'*, देखलै अछि *dekh'lai achh'*, देखलैक अछि *dekh'laik achh'*, and देखली अछि *dekh'lí achh'*. The forms देखलिऔ अछि *dekh'liau achh'*, देखलिऔक अछि *dekh'liauk achh'*, देखलौ अछि *dekh'lau achh'*, देखलौक अछि *dekh-lauk achh'*, and देखलिअह अछि *dekh'liah' achh'*, are also used but only in the first person.

(2) Other forms are देखलेँ अछि *dekh'lẽ achh'*, देखलैँ अछि *dekh'lãi achh'*, देखलहक अछि *dekh'lahak achh'*, देखलहीक अछि *dekh'lahík achh'*.

(4) Other forms are देखलकै अछि *dekhal'kai achh'*, देखलकैक अछि *dekhal'kaik achh'*, देखलकौ अछि *dekhal'kau achh'*, and देलखकौक अछि *dekhal'kauk achh'*.

FEMININE.

The following forms are substituted :—

In (1) For देखल *dekhal*; देखलि *dekhal'*.

In (2) For देखलह *dekh'lah;* देखलिँहि *dekh'lĩh'*, or देखलीँ हि *dekh'lĩ'h'*.

FORM II.

Used when special respect is attributed to the object.

MASCULINE.

Honorific.

1st P. देखलैन्हि अछि *dekh'lainh' achh'*,

2nd P. देखलैन्हि अछि *dekh'lainh' achh'*,

3rd P. देखलथून्हि अछि *dekhal'thúnh' achh'*.

Non-Honorific.

1st P. देखलैन्हि अछि *dekh'lainh' achh'*,

2nd P. देखलहून्हि अछि *dekh'lahúnh' achh'*,

3rd P. देखलकैन्हि अछि *dekhal'kainh' achh'*.

(1) Another form is देखलिऐन्हि अछि *dekh'liainh' achh'*.

(3) Another form is देखलथीन्हि अछि *dekhal'thuĩh' achh'*.

FEMININE.

The FEMININE is the same as the Masculine.

§ 140. SECOND CONJUGATIONAL FORM.

Formed by adding the present tense of the auxiliary verb to an inflected form of the Past Participle.

FORM I.

Used when no special respect is attributed to the object.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	देखलें छी *dekh'lẽ chhí*,[1]	देखलें छी *dekh'lẽ chhí*,[1]
2nd P.	देखलें छी *dekh'lẽ chhí*,[1]	देखलें छह *dekh'lẽ chhah*,[2]
3rd P.	देखलें छथि *dekh'lẽ chhath'*,[3]	देखलें अछि *dekh'lẽ achh'*.[4]

(1) Other forms of the auxiliary may be substituted, as in the Present Tense. *q. v.*

(2) Other forms of the auxiliary may be substituted, as in the Present Tense. *q. v.*

(4) Other forms of the auxiliary may be substituted, as in the Present Tense. *q. v.*

FEMININE.

The FEMININE is the same as the masculine, except that in the 2nd Person Non-Honorific the form देखलें छह *dekh'lẽ chhah* is not used ; the form देखलें छहिँ *dekh'lẽ chhah'ñ* or देखलें छँहिँ *dekh'lẽ chhãh'ñ* being substituted.

FORM II.

Used when special respect is attributed to the object.

MASCULINE.

Honorific.

1st P. देखलें छिऐन्हि *dekh'lẽ chhiainh'*,[1]
2nd P. देखलें छिऐन्हि *dekh'lẽ chhiainh'*,[1]
3rd P. देखलें छथून्हि *dekh'lẽ chhathúnh'*,[3]

Non-Honorific.

1st P. देखलें छिऐन्हि *dekh'lẽ chhiainh',*[1]
2nd P. देखलें छहुन्हि *dekh'lẽ chhahúnh',*[2]
3rd P. देखलें छैन्हि *dekh'lẽ chhainh'.*[4]

(3) As in the Present, another form of the auxiliary is छथीन्हि *chhathính'*.

FEMININE.

The FEMININE is the same as the masculine.

§ 141. *c.* THE PLUPERFECT.

"I had seen," etc.

FORM I.

Used when no special respect is attributed to the object.

MASCULINE.

Honorific.

1st P. देखलें छलहुँ *dekh'lẽ chhalah'ñ,*[1]
2nd P. देखलें छलहुँ *dekh'lẽ chhalah'ñ,*[1]
3rd P. देखलें छलाह *dekh'lẽ chhaláh',*[3]

Non-Honorific.

1st P. देखलें छलहुँ *dekh'lẽ chhalah'ñ,*[1]
2nd P. देखलें छलाह *dekh'lẽ chhaláh,*[2]
3rd P. देखलें छल *dekh'lẽ chhal.*[4]

(1) Other forms of the auxiliary may be substituted as in the Imperfect Tense. *q. v.*

(2) Other forms of the auxiliary may be substituted as in the Imperfect Tense. *q. v.*

(4) Other forms of the auxiliary may be substituted as in the Imperfect Tense. *q. v.*

FEMININE.

In the FEMININE the following forms are substituted.—

In (2 & 3). For देखलेँ छलाह *dekh'lē chhaláh* ; देखलेँ छलीह *dekh'lē chhalíh'*, or देखलेँ छलीहि *dekh'lē chhalíh'*. The remaining forms are common to both genders.

In (4). For देखलेँ छल *dekh'lē chhal* ; देखलेँ छलि *dekh'lē chhal'*.

FORM II.

Used when special respect is attributed to the object.

MASCULINE.

Honorific.

1st P. देखलेँ छलिऐन्हि *dekh'lē chhaliainh'*,[1]
2nd P. देखलेँ छलिऐन्हि *dekh'lē chhaliainh'*,[1]
3rd P. देखलेँ छलथून्हि *dekh'lē chhal'thúnh'*,[3]

Non-Honorific.

1st P. देखलेँ छलिऐन्हि *dekh'lē chhaliainh'*,[1]
2nd P. देखलेँ छलहुन्हि *dekh'lē chhal'húnh'*,[2]
3rd P. देखलेँ छलैन्हि *dekh'lē chhalainh'*.[4]

(3) Another form is देखलेँ छलथीन्हि *dekh'lē chhal'thính'*.

FEMININE.

The FEMININE is the same as the masculine.

§ 142. *Participles—Declinable.*

ADJECTIVE PARTICIPLES.

Present, 'seeing'.

MASCULINE.

देखैत *dekhait.*

FEMININE.

देखैति *dekhait'.*

Past, 'seen'.

MASCULINE.

देखल, देखल भेल, *dekhal*, or *dekhal bhel.*

FEMININE.

देखलि, देखल भेलि, *dekhal'*, or *dekhal bhel'*.

§ 143. *Participles—Indeclinable.*

CONJUNCTIVE PARTICIPLES.

'seeing', 'having seen'.

देखिकँ *dekhikã*, देखिकैँ *dekhikãi*, देखिकैकँ *dekhikaikã*,

ADVERBIAL PARTICIPLES.

देखितहिँ *dekhitah'ñ*, 'on seeing', 'in the act of seeing'.

§ 144. *Precative or Respectful Forms.*

1. RESPECTFUL IMPERATIVE.

देखल जाय *dekhal jáy* and देखल जाओ *dekhal jáo*, 'be you,' or 'ye pleased to see'.

2. RESPECTFUL FUTURE.

देखल जाएत *dekhal jáet*, or देखल जाएतग *dekhal jáet'ga*, 'you will see,' or 'will be pleased to see'.

3. MILD IMPERATIVE.

देखिह *dekhiha*, 'see you', or 'see ye'.

INFINITIVE *or* VERBAL NOUN.

§ 145. देखब *dekhab*, 'to see'.

CHAPTER X.

THE INTRANSITIVE VERB.

§ 146. Theoretically speaking, as already pointed out, the Neuter Verb should be wanting in all those tense-forms, which in the Transitive Verb fall under Form II ; i. e. those in which special respect is attributed to the object. Such, however, is not altogether the case, for the Neuter Verb, while affecting most of the tense-forms of Form I, also indulges pretty freely in those of Form II. What tense forms it uses and what it discards will be learned from the following paradigms.

§ 147. The conjugation of the Past Tense, in the Neuter Verb, differs in many respects from that of the same tense in the Verb Transitive, and should be noted.

In the Transitive Verb there are two conjugational forms of the Perfect Tense. In the Neuter Verb there is only one. It is formed by subjoining the word अछि *achh'*, to the conjugated Past Tense. Only one or two inflexions of the second conjugational form are used in the 2nd person non-honorific.

§ 148. The verb सूतब *sútab* 'to sleep', is an example of a verb whose root-vowel (ऊ *ú*) is long. When such a vowel is आ *á* * ई *í* or *ú*, it is liable to be shortened in certain cases.

viz. It is shortened

(1) If it is followed in the same word by another long vowel or diphthong. Example, सुतौ *sutau*. The only exceptions to this are certain forms of the first and second persons of the Prospective Conditional and the Imperative, and the anomalous Future form सुतीग *sutíga*.

(2) If it is followed in the same word by three syllables, any of which contains either the vowel इ *i*, or the vowel उ *u*. Example, सुतिअह *sutiah'*. If neither of these vowels follows, the root-vowel may be long or short. Example, सूतहक *sútahak*, or सुतहक *sutahak*.

(3) If it be followed in the same word by any number of syllables more than three. Example, सुतबहक *sutabahak* : but सूतहक *sútahak*, where only three syllables, none of which contains either इ *i* or उ *u*, follow the root-vowel ऊ *ú*.

(4) Also in the Mild Imperative, the vowel is shortened in spite of the foregoing rules. Thus:—

सुतिह *sutiha*, 'be pleased to sleep'.

Model verb सूतब *sútab*, 'to sleep'.

§ 149. Root ... . सूत् *sút*, 'sleep'.
Present Participle ... सुतैत *sutait*, 'sleeping'.
Past Participle ... ... सूतल *sútal*, 'slept'.

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* There is a considerable diversity of custom with regard to the shortening of आ *á*. Some speakers shorten it as often as ई *í* or ऊ *ú* are shortened. Others always keep it lengthened; and others again only keep it lengthened when आ *á* is the root-vowel of an Active or Causal Verb, which has been lengthened from the radical अ *a* of a Neuter Verb, as will be seen later on. An example of the last case is the आ in मारब *márab*, 'to kill', which is the Active form of the Neuter Verb मरब *marab*, 'to die'. This last custom is probably the most correct of the three.

§ 150. 1. Four tenses are formed from the root, सूत् *sút*.

a. THE PROSPECTIVE CONDITIONAL *or* SIMPLE PRESENT.

'(If) I see', 'I see', etc.

	Honorific.	*Non-Honorific.*
1st P.	सूती *súti*,[1]	सूती *súti*,[1]
2nd P.	सूती *súti*,[1]	सूतह *sútah*,[2]
3rd P.	सूतथि *sútath'*,[3]	सुतौ *sutau*.[4]

(1) Other forms are सुतिऐ *sutiai*, and सुतिऐक *sutiaik*. The forms सुतिऔ *sutiau*, सुतिऔक *sutiauk*, and सुतिअह *sutiah'* are also used, but only in the first person. The form सुतिऐन्हि *sutiainh'* is also used, but only in the first and second persons Honorific.

(2) Other forms are सुतहुन्हि, *sut'húnh'*, सूतहक *sútahak*, and सुतहीक *sutahík*.

(3) Another form is सुतथून्हि *sut'thúnh'*.

(4) Another form is सुतैन्हि *sutainh'*.

The FEMININE is as the masculine, except that in the second person Non-Honorific the form सूतह *sútah*, is not used, the form सूतहिँ *sútah'ñ* or सुतँहिँ *sutãh'ñ* being used instead.

§ 151. *b.* THE FUTURE.

'I shall or will sleep', etc.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	सूतब *sútab*,[1]	सूतब *sútab*,[1]
2nd P.	सूतब *sútab*,[1]	सूतबह *sút'bah*,[2]
3rd P.	सुतताह *sut'táh*,[3]	सूतत *sútat*[4]

(1) Other forms are सुतबै *sut'bai*, सुतबैक *sut'baik*, सुततिऐ *sut'tiai*, सुततिऐक *sut'tiaik*, सुतितँह *sutitãh'ñ*. The form सुतबैन्हि *sut'bainh'* is used only in

the first and second person Honorific. The forms सुतबौ *sut'bau*, सुतबौक *sut'bauk*, सुततिऔ *sut'tiau*, सुततिऔक *sut'tiauk*, सुतिऔ *sutiau*, सुतिऔक *sutiauk*, सुतिअह *sutiah'*, and सूतीग *sútiga*, are also used, but only in the first person.

(2) Other forms are सुतबें *sut'bē*, सुतबहक *sut'bahak*, and सुतबहीक *sut'bahík*.

(3) Other forms are सुतथीन्हि *sut'thính'*, and सुतथून्हि *sut'thúnh'*.

(4) Other forms are सुततैन्हि *sut'tainh'*, सुततौ *sut'tau*, सुततौक *sut'tauk*, सुततै *sut'tai*, सुततैक *sut'taik*.

In the FEMININE the following forms are substituted.

For (2), सुतबँहिँ *sut'bāh'n̄*.

For (3), सुततीह *sut'tíh*, or सुततिहि *sut'tih'*.

For (4), सूतति *sútat'*.

NOTE. That to all the above forms, with the exception of सूतीग *sútiga*, the termination ग *ga*, can optionally be added. In this syllable the inherent अ *a*, is pronounced. E. g. सूतब *sútab*, or सूतबग *sútab'ga*.

§ 152. *c.* THE IMPERATIVE.

'Let me sleep,' 'Sleep thou,' etc.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	सूतू *sútú*,[1]	सूतू *sútú*,[1]
2nd P.	सूतू *sútú*,[1]	सूतह *sútah*,[2]
3rd P.	सूतथु *sútath'*,[3]	सुतौ *sutau*.[4]

(1) Other forms सुतिऐ *sutiai*, सुतिऐक *sutiaik*, सुतिऔ *sutiau*, सुतिऔक *sutiauk*, and सुतिअह *sutiah'*. The forms सुतिऐन्हि *sutiainh'*, and सुतिऔन्हि *sutiaunh'*, are also used but only in the first person and second person Honorific.

(2) Other forms are सुतहून्हि *sut'húnh'*, सूत *sút*, सूतहक *sútahak*, and सुतहीक *sutahík*.

(3) Another form is सुतथून्हि *sut'thúnh'*.

The FEMININE is as the masculine, except that in the feminine of the second person Non-Honorific the form सुतह *sútah*, is not used ; the form सुतहिँ *sútah'ñ* or सुतँहिँ *sútãh'ñ* being used instead.

§ 153. *d.* THE RETROSPECTIVE CONDITIONAL.

'If I had slept,' etc.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	सुतितहुँ *sutitah'ñ*,[1]	सुतितहुँ *sutitah'ñ*,[1]
2nd P.	सुतितहुँ *sutitah'ñ*,[1]	सुतितह *sutitah*,[2]
3rd P.	सुतितथि *sutitath'*,[3]	सुतैत *sutait*.[4]

(1) Other forms are सुतितिऐ *sutitiai*, सुतितिऐक *sutitiaik*. The forms सुतितिऔ *sutitiau*, सुतितिऔक *sutitiauk*, and सुतितहु *sutitah*,' are also used but only in the first person. The form सुतितिऐन्हि *sutitiainh'* is used in the first person and second person Honorific.

(2) Other forms are सुतितें *sutitẽ*, सुतितहुन्हि *sutitahúnh'*, सुतितहक *sutitahak*, सुतितहीक *sutitahík*.

(3) Other forms are सुतितथीन्हि *sutitathính'*, and सुतितथुन्हि *sutitathúnh'*.

(4) Other forms are सुतितै *sutitai*, सुतितैक *sutitaik*, सुतितौ *sutitau*, सुतितौक *sutitauk*, and सुतितैन्हि *sutitainh'*,

The FEMININE is as the masculine, except that in the second person Non-Honorific the form सुतितह *sutitah* is not used ; the form सुतितहिँ *sutitah'ñ* or सुतितँहिँ *sutitãh'ñ* being used instead.

§ 154. 2. Two tenses are formed from the present participle सुतैत *sutait.*

a. THE PRESENT.

'I sleep', or 'am sleeping', etc.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	सुतैत छी *sutait chhí,*[1]	सुतैत छी *sutait chhí,*[1]
2nd P.	सुतैत छी *sutait chhí,*[1]	सुतैत छह *sutait chhah,*[2]
3rd P.	सुतैत छथि *sutait chhath',*[3]	सुतैत अछि *sutait achh'.*[4]

(1) Other forms are सुतैत छिऐ *sutait chhiai,* and सुतैत छिऐक *sutait chhiaik.* The forms सुतैत छिऔ *sutait chhiau,* सुतैत छिऔक *sutait chhiauk,* and सुतैत छिअह *sutait chhiah'* are also used, but only in the first person. The form सुतैत छिऐन्हि *sutait chhiainh'* is used in the first person and second person Honorific.

(2) Other forms are सुतैत छें *sutait chhẽ,* सुतैत छैं *sutait chhãi,* सुतैत छहक *sutait chhahak,* सुतैत छहीक *sutait chhahík,* and सुतैत छहुन्हि *sutait chhahúnh'.*

(3) Other forms are सुतैत छथीन्हि *sutait chhathính',* and सुतैत छथुन्हि *sutait chhathúnh'.*

(4) Other forms are सुतैत छै *sutait chhai,* सुतैत छैक *sutait chhaik,* सुतैत छौ *sutait chhau,* सुतैत छौक *sutait chhauk,* and सुतैत छैन्हि *sutait chhainh'.*

FEMININE.

The FEMININE is the same as the masculine, except that the feminine form of the Present Participle, सुतैति *sutait',* is used instead of the masculine सुतैत *sutait.* E. g. सुतैति छी *sutait' chhí,* instead of सुतैत छी *sutait chhí.* The form सुतैति छह *sutait' chhah* (which might be expected as the 2nd person Non-Honorific) is not used, and in its place is used सुतैति छहिँ *sutait' chhah'ñ* or सुतैति छँहिँ *sutait' chhãh'ñ.*

NOTE. In the above forms, when masculine, the final °त *-t* of the present participle may be, and usually is omitted. The Participle and auxiliary then form one word. E. g. सुतैत छी *sutait chhí,* or सुतैछी *sutaichhí.* Similarly, when feminine the final °ति *-t'* of the participle may be omitted. E. g. सुतैति छी *sutait' chhí,* or सुतैछी *sutaichhi.*

§ 155.

b. THE IMPERFECT.

	Honorific.	*Non-Honorific.*
1st P.	सुतैत छलहुँ *sutait chhalah'ñ*[1]	सुतैत छलहुँ *sutait chhalah'ñ*,[1]
2nd P.	सुतैत छलहुँ *sutait chhalah'ñ*,[1]	सुतैत छलाह *sutait chhaláh*,[2]
3rd P.	सुतैत छलाह *sutait chhaláh*,[3]	सुतैत छल *sutait chhal*.[4]

(1) Other forms are सुतैत छलिऐ *sutait chhaliai*, and सुतैत छलिऐक *sutait chhaliaik*. The forms सुतैत छलिऔ *sutait chhaliau*, सुतैत छलिऔक *sutait chhaliauk*, and सुतैत छलिअहु *sutait chhaliah'* are also used, but only in the first person. The form सुतैत छलिऐन्हि *sutait chhaliainh'* is used in the first person and second person Honorific.

(2) Other forms are सुतैत छलें *sutait chhalē*, सुतैत छलैं *sutait chhalāi*, सुतैत छलहक *sutait chhal'hak*, सुतैत छलहीक *sutait chhal'hík*, and सुतैत छलहुन्हि *sutait chhal'húnh'*.

(3) Other forms are सुतैत छलथीन्हि *sutait chhal'thính'*, and सुतैत छलथून्हि *sutait chhal'thúnh'*.

(4) Other forms are सुतैत छलै *sutait chhalai*, सुतैत छलैक *sutait chhalaik*, सुतैत छलौ *sutait chhalau*, सुतैत छलौक *sutait chhalauk*, and सुतैत छलैन्हि *sutait chhalainh'*.

FEMININE.

The FEMININE is the same as the masculine, except that the feminine form of the Present Participle सुतैति *sutait'* is used. E. g. सुतैति छलहुँ *sutait' chhalah'ñ*. The forms for the 3rd Person Honorific and the 2nd Person Non-Honorific, are सुतैति छलीह *sutait' chhalíh*, and सुतैति छलीहि *sutait' chhalíh'* instead of सुतैत छलाह *sutait chhaláh*. The form सुतैति छलि *sutait' chhal'* is substituted for सुतैत छल *sutait chhal*, in the 3rd Person Non-Honorific.

NOTE. As in the present tense the masculine termination ०त *-t*, and the feminine termination ०ति *-t'* of the present participle may optionally be omitted. E. g. सुतैत छलहुँ *sutait chhalah'ñ*, or सुतैछलहुँ *sutaichhalah'ñ*. The latter is the more usual form.

§156. 3. Three tenses are formed from the Past Participle सूतल *sútal.*

a. THE PAST.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	सुतलहुँ *sut'lah'ñ,*[1]	सुतलहुँ *sut'lah'ñ,*[1]
2nd P.	सुतलहुँ *sut'lah'ñ,*[1]	सुतलाह *sut'láh,*[2]
3rd P.	सुतलाह *sut'láh,*[3]	सूतल *sútal.*[4]

(1) Other forms are सुतलिऐ *sut'liai*, and सुतलिऐक *sut'liaik*. The form सुतलिअह *sut'liah'* is also used, but only in the first person. सुतलिऐन्हि *sut'liainh'* is used in the first person and second person Honorific.

(2) Other forms are सुतलें *sut'lē*, सुतलैं *sut'lãi*, सुतलहक *sut'lahak*, सुतलहीक *sut'lahík*, and सुतलहून्हि *sut'lahúnh'*.

(3) Other forms are सुतलन्हि *sut'lanh'*, सुतलथीन्हि *sutal'thính'*, and सुतलथून्हि *sutal'thúnh'*.

(4) Other forms are सुतलै *sut'lai*, सुतलैक *sut'laik*, सुतलौ *sut'lau*, सुतलौक *sut'lauk*, and सुतलैन्हि *sut'lainh'*.

In the FEMININE the following forms are substituted.

For 2 & 3, सुतलीह *sut'líh*, or सुतलीहि *sut'líh'*.

For 4, सूतलि *sútal'*.

§ 157. *b.* THE PERFECT.

'I have slept', etc.

MASCULINE.

Honorific.

1st P. सुतलहुँ अछि *sut'lah'ñ achh',*[1]
2nd P. सुतलहुँ अछि *sut'lah'ñ achh',*[1]
3rd P. सुतलाह अछि *sut'láh achh',*[3]

Non-Honorific,

1st P. सुतलहुँ अछि *sut'lah'ñ achh',*[1]
2nd P. सुतलाह अछि *sut'láh achh,'*[2]
3rd P. सुतलक अछि *sut'lak achh'.*[4]

1. Other forms are सुतलिऐ अछि *sut'liai achh'*, सुतलिऐक अछि *sut'liaik achh'*. The form सुतलिअह अछि *sut'liah' achh'* is also used, but only in the first person. सुतलिऐन्हि अछि *sut'liainh' achh'* is used in the first person and second person Honorific.

2. Other forms are सुतलें छह *sut'lē chhah*, सुतलें छहक *sut'lē chhahak*, सुतलें छहीक *sut'lē chhahík*, सुतलें छहुन्हि *sut'lē chhahúnh'*, सुतलहक अछि *sut'lahak achh'*, सुतलहीक अछि *sut'lahík achh'*, and सुतलहुन्हि अछि *sut'lahúnh' achh'*.

3. Other forms are सुतलन्हि अछि *sut'lanh' achh'*, सुतलथीन्हि अछि *sutal'thính' achh'*, and सुतलथून्हि अछि *sutal'thúnh' achh'*.

4. Other forms are सुतलै अछि *sut'lai achh'*, सुतलैक अछि *sut'laik achh'*, सुतलौ अछि *sut'lau achh'*, सुतलौक अछि *sut'lauk achh'* and सुतलैन्हि अछि *sut'lainh' achh'*.

In the FEMININE the following forms are substituted.

For 2 & 3, सुतलीह अछि *sut'líh achh'* or सुतलीहि अछि *sut'líh' achh*.

§ 158. *c.* THE PLUPERFECT.

'I had slept,' etc.

MASCULINE.

	Honorific.	*Non-Honorific.*
1st P.	सुतलेँ छलहुँ *sut'lē chhalah'ñ,*[1]	सुतलेँ छलहुँ *sut'lē chhalah'ñ,*[1]
2nd P.	सुतलेँ छलहुँ *sut'lē chhalah'ñ,*[1]	सुतलेँ छलाह *sut'lē chhaláh,*[2]
3rd P.	सुतलेँ छलाह *sut'lē chhaláh,*[3]	सुतलेँ छल *sut'lē chhal.*[4]

(1) Other forms are सुतलें छलिऐ *sut'lē chhaliai*, and सुतलें छलिऐक *sut'le chhaliaik*.

(2) Other forms are सुतलें छलें *sut'lē chhalē*, सुतलें छलैं *sut'lē chhalãi*, सुतलें छलहक *sut'lē chhal'hak*, सुतलें छलहीक *sul'lē chhal'hík*.

(3) Other forms are सुतलें छलथीन्हि *sut'lē chhal'thính'* and सुतलें छलथून्हि *sut'lē chhal'thúnh'*.

(4) Other forms are सुतलें छलै *sut'lē chhalai*, सुतलें छलैक *sut'lē chhalaik*, सुतलें छलौ *sut'lē chhalau*, and सुतलें छलौक *sut'lē chhalauk*.

In the FEMININE the following forms are substituted.
For 2 & 3, सुतलें छलीह *sut'lẽ chhalíh*, or सुतलें छलीहि *sut'lẽ chhalíh.'*
For 4, सुतलें छलि *sut'lẽ chhal'*.

§ 159. 1. *Participles—Declinable.*

ADJECTIVE PARTICIPLES.

Present, 'sleeping'.

MASCULINE.	FEMININE.
सुतैत *sutait.*	सुतैति *sutait'*.

Past, 'slept'.

MASCULINE.	FEMININE.
सूतल *sútal.*	सूतलि *sútal'*.

§ 160. *Participles—Indeclinable.*

CONJUNCTIVE PARTICIPLES.

'sleeping', 'having slept'.

सूतिकँ *súť kã*, सूतिकैँ *súť kãi*, सूतिकैकँ *súť kaikã.*

ADVERBIAL PARTICIPLES.

सुतितहिँ *sutitah'ñ*, 'on sleeping,' 'in the act of sleeping'.

§ 161. *Precative or Respectful Forms.*

1. RESPECTFUL IMPERATIVE.

सूतल जाय *sútal jáy*, and सूतल जाओ *sútal jáo*, 'be you', or 'ye pleased to sleep'.

2. RESPECTFUL FUTURE.

सूतल जाएत *sútal jáet*, or सूतल जाएतग *sútal jáet'ga*, 'you will sleep', or 'will be pleased to sleep'.

MILD IMPERATIVE.

सुतिह *sutiha*, 'sleep you' or 'sleep ye'.

§ 162. *Infinitive or Verbal Noun.*

सूतब *sútab.*

CHAPTER XI.

OBSERVATIONS ON THE FOREGOING.

§163. Attentive consideration of the foregoing shews that the conjugational forms range themselves under one of two great classes according as the object of the verb is Honorific or Non-Honorific. It may indeed be said that there are two distinct conjugations,—one in which the object is Non-Honorific, and another in which it is Honorific.

§164. In order to make this plain, I here give the more usual masculine terminations of each conjugation, separately in a tabular form.

FIRST CONJUGATION.

Viz. That in which the object is Non-Honorific (including the conjugation of Intransitive Verbs).

(1) Tenses formed from the root देख् *dekh.*

	Prospective Conditional.		Future.		Imperative.		Retrospective Conditional.	
	Subject Honorific.	Subjec Non-Honorific.	Subject Honorific	Subject Non-Honorific.	Subject Honorific.	Subject Non-Honorific.	Subject Honorific	Subject Non-Honorific.
1st Person	ईं		अब		ऊ		इतहुँ	
2nd Person	Do	अह	Do	अबह	Do	अह	Do	इतह
3rd Person	अथि	औ	अताह	अत	अथु	औ	इतथि	ऐत

(2) Tenses formed from the present participle देखैत *dekhait.*

		Present		Imperfect.	
		Subject Honorific.	Subject Non-Honorific.	Subject Honorific.	Subject Non-Honorific.
1st Person		छी		छलहुँ	
2nd Person		Do.	छह	Do.	छलाह
3rd Person		छथि	अछि	छलाह	छल

(3) Tenses formed from the past participle देखल *dekhal.*

	Transitive Past.		Intransitive Past.		Transitive Perfect, (2nd Form).		Pluperfect.	
	Subject Honorific.	Subject Non-Honorific.	Subject Honorific.	Subject Non-Honorific.	Subject Honorific.	Subject Non-Honorific.	Subject Honorific.	Subject Non-Honorific.
1st Person	° अहुँ		° अहुँ		° एँ छी		° एँ छलहुँ	
2nd Person	Do.	° अह	Do.	° आह	Do.	° एँ छह	Do.	° एँ छलाह
3rd Person	° अन्हि	° अक	° आह	—	° एँ छथि	° एँ अछि	° एँ छलाह	° एँ छल

The sign ° signifies that the final vowel of देखल is omitted before the termination.

SECOND CONJUGATION.

Viz. That in which the object is Honorific .

(1) Tenses formed from the root देख् *dekh.*

	Prospective Conditional.		Future.		Imperative.		Retrospective Conditional.	
	Subject Honorific.	Subject Non-Honorific.	Subject Honorific.	Subject Non-Honorific.	Subject Honorific.	Subject Non-Honorific.	Subject Honorific.	Subject Non-Honorific.
1st Person	इऐन्हि		अबैन्हि		इऐन्हि		इतिऐन्हि	
2nd Person	Do	अइन्हि	Do	अबइन्हि	Do	अइन्हि	Do	इतइन्हि
3rd Person	अथून्हि	औन्हि	अथून्हि	अतैन्हि	अथून्हि	औन्हि	इतथून्हि	इतैन्हि

(2) Tenses formed from the present participle देखैत *dekhait.*

		Present.		Imperfect.	
		Subject Honorific.	Subject Non-Honorific.	Subject Honorific.	Subject Non-Honorific.
1st Person		छिऐन्हि		छलिऐन्हि	
2nd Person		Do.	छइन्हि	Do.	छलइन्हि
3rd Person		छथून्हि	छैन्हि	छलथून्हि	छलैन्हि

(3) Tenses formed from the past participle देखल *dekhal.*

	Transitive Past.		Transitive Perfect, (2nd Form).		Pluperfect.		
	Subject Honorific.	Subject Non-Honorific.	Subject Honorific.	Subject Non-Honorific.	Subject Honorific.	Subject Non-Honorific.	
1st Person	° ऐन्हि		° एँ छिऐन्हि		एँ छलिऐन्हि		
2nd Person	Do.	° अइन्हि	Do.	° एँ छइन्हि	Do.	° एँ छलाह	
3rd Person	° अथून्हि	° अकैन्हि	° एँ छथून्हि	° एँ छैन्हि	° एँ छलथून्हि	° एँ छलैन्हि	

The sign ° signifies that the final vowel of देखल is omitted before the termination.

CHAPTER XII.

VERBS WITH ROOTS ENDING IN VOWELS.

§ 165. The roots of both the verbs just conjugated end in consonants. When the root ends in a vowel some slight difficulties occur, which require to be noted. I therefore give two examples of such verbs, not conjugating them fully, but giving, of one the first and third persons singular of the non-honorific first form, and of the other a fuller conjugation : noting at the same time any irregularities which may occur in the other forms.

I shall first give an example of a root ending in a vowel other than आ *á*. These verbs are nearly regular.

§ 166. EXAMPLE OF A ROOT ENDING IN A VOWEL OTHER THAN आ *á*.

MODEL VERB सिअब *siab* "to sew".

Principal Parts.

Root,	सि *si*, "sew,"
Present Participle,	सिऐत *siait*, or सिउत *siut*, "sewing",
Past Participle,	सिअल *sial*, or सिउल *siul*, "sewn."

FIRST FORM. NON-HONORIFIC.

1st. Person.	3rd. Person.
PROSPECTIVE CONDITIONAL.	
सिई *sií*,	सिऔ *siau*.

NOTE.—In the optional forms the letter ब *b* is inserted as follows. Some writers use व् *v* instead of ब् *b*. In pronunciation, however, the sound is something between *b* and *v*.

1st PERSON. सिबिऐ(क) *sibiai(k)*, सिबिऔ(क) *sibiau(k)*, सिबिअह *sibiah'*.

2nd PERSON. *Non-Honorific.* सिबह *sibah*, सिबहक *sib'hak*, सिबहीक *sib'hík*, सिबहुन्हि *sib'húnh'*.

3rd PERSON. *Honorific*, सिबथि *sibath'*, or सिअथि *siath'*, सिबथुन्हि *sib'thúnh'*. *Non-Honorific*, सिबैन्हि *sibainh'*.

FUTURE.

सिअब *siab*, सिअत *siat* or सिउत *siut*.

NOTE. In the 1ST. PERSON instead of the forms सिअबै(क) *siabai(k)*, the forms सिबै(क) *sibai(k)* may optionally be used. The form सिइअह *siiah'* is seldom used.

IMPERATIVE.

सिऊ *siú*. सिऔ *siau*.

Optional forms of the 1ST PERSON are, सितिऐ(क) *sitiai(k)*, सितिऔ(क) *sitiau(k)*, सितिअह *sitiah'*, and सितिऐन्हि *sitiainh'*, in all of which the letter त् *t* has been inserted.

2ND PERSON. *Non-Honorific*, Optional forms are सित *sit*, सितहक *sit'hak*, सितहीक *sit'hík*, and सितहन्हि *sit'hánh'*.

3RD PERSON. *Honorific*, The form for this person is सिअथुन्हि *siathúnh'*.

RETROSPECTIVE CONDITIONAL.

I conjugate this tense in full.

	Honorific.	*Non-Honorific.*
1st P.	सिइतहुँ *siitah'ñ*, or सितहुँ *sitah'ñ*,	*As in the Honorific.*
2nd P.	*As in the 1st. P.*,	सिइतह *siitah*, or सितह *sitah*,
3rd P.	सिइतथि *siitath'* or सितथि *sitath'*,	सिऐत *siait*.

PAST.

1st P. सिअलहुँ *sialah'ñ*, or सिउलहुँ *siulah'ñ*.

3rd P. सिअल *sial*, or सिउल *siul*.

The other tenses do not require explanation, being perfectly regular, and presenting no difficulty.*

§ 167. Example of a root ending in long आ *á*.

Model verb. पाएब *páĕb* "to obtain."

Principal Parts.

Root, ... पा *pá*, "obtain."

Present Participle, पवैत *pavait*, or पाइत *páit*, "obtaining".

Past Participle, पाओल *páŏl*, or पाएल *páĕl*, "obtained."

In order to show the conjugation of this class of verbs clearly, I decline it throughout in the first conjugational form. I omit the first Person non-Honorific, and the 2nd Person Honorific, as they are the same in form as the 1st Person Honorific. Note, however, that as usual, certain optional forms are wanting in the 2nd Person Honorific.

Prospective Conditional.

	Honorific.	*Non-Honorific.*
1st P.	पाइ *pái*,[1]	——
2nd P.	——	पाबह *pábah*[2]†
3rd P.	पाबथि *pábath'*,[3]†	पतौ *patau*.[4]

Optional forms.

(1) पैऐ(क) *paiai(k)*, पैऔ(क) *paiau(k)*, पैअह *paiah'*.

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* Other examples are चूअब *chúab*, "to drip". 1. Imperative चूबू *chúbú*; 2. Fut. चूइब *chúib* or चूअब *chúab*; 3. Do. चूइत *chúit* or चूअत *chúat*; Past Part. चूइल *chúil*, or चूअल *chúal*. धोएब *dhoĕb*, "to wash". 1. Imperative धोबू *dhobú*; 1. Fut. धोएब *dhoĕb* or धोअब *dhoab*; 3. do. धोएत *dhoĕt*, or धोअत *dhoat*; Past Part. धोएल *dhoĕl*. or धोअल *dhoal*. Generally speaking ब् *b* or व् *v* may optionally be inserted between concurrent vowels.

† In this and all similar cases, व *v* is written by some for ब *b*. See § 166.

(2) पैह *paih*, पैअहक *paiahak*, पैअहीक *paiahík*.

The second conjugational forms are

(1) पैएन्हि *paiainh'*, (2) पैअहुन्हि *paiahúnh'*, (3) पैथुन्हि *paithúnh'*.
(4) पबौन्हि *pabaunh'*.

FUTURE.

1st P.	पाएब *páĕb*,[1]	——
2nd P.	——	पैबह *paibah*,[2]
3rd P.	पैताह *paitáh*, or पौताह *pautáh*,[3]	पाएत *páĕt*, or पाओत *páŏt*.[4]

Optional forms.

(1) पैबै(क) *paibai(k)*, पैबौ(क) *paibau(k)*, पैतिऐ(क) *paitiai(k)* पैतिऔ(क) *paitiau(k)*, पैऔक *paiau(k)*, पैअहँ *paiah'ñ*, पैतहँ *paitah'n*, पाइग *páiga*.

(2) पैबें *paibĕ*, पैबहक *paib'hak*, पैबहीक *paib'hík*.

(4) पैतै(क) *paitai(k)*, पैतौ(क) *paitau(k)*,

The second conjugational forms are

(1) पैबैन्हि *paibainh'*, (2) पैबहुन्हि *paib'húnh'*, (3) पैथुन्हि *paithúnh'*, पैतैन्हि *paitainh'*.

In all the above forms औत *aut* may be substituted for ऐत *ait* throughout; as पौतिऐ *pautiai*, पौतैन्हि *pautainh'*, &c.

IMPERATIVE.

1st. P.	पाऊ *páú*[1]	——
2nd. P.	——	पाबह *pábah'*,[2]*
3rd. P.	पाबथु *pábath'*,[3]*	पतौ *patau*,[4]

Optional forms, as in the Prospective Conditional.

RETROSPECTIVE CONDITIONAL.

1st P.	पैतहुँ *paitah'ñ*,[1]	——
2nd P.	——	पैतह *paitah*,[2]
3rd P.	पैतथि *paitath'*[3]	पबैत *pavait*.[4]

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*In this and all similar cases, व *v* is written by some for ब *b*. See § 166.

Optional forms.

(1) पैतिऐ(क) *paitiai(k)*, पैतिऔ(क) *paitiau(k)*, पैतह *paitah'*.
(2) पैतेँ *paitē*, पैतहक *pait'hak*, पैतहीक *pait'hík*.
(4) पैतै(क) *paitai(k)*, पैतौक *paitau(k)*.

The 2nd. conjugational forms are,

(1) पैतिऐन्हि *paitiainh'*, (2) पैतहुन्हि *pait'hánh'*, (3) पैतथुन्हि *pait'thúnh'*, पैतैन्हि *paitainh'*.

For पैत *pait*, पौत *paut* or पवित *pavit* may be used throughout; thus पौतहुँ *pautah'ñ*, पवितहुँ *pavitah'ñ*, &c.

The *Present* and *Imperfect* are regular and do not require comment.

PAST.

1st	P. पौलहुँ *paulah'ñ*,[1]	———
2nd	P. ———	पौलह *paulah'*,[2]
3rd	P. पौलन्हि *paulanh'*,[3]	पौलक *paulak*.[4]

OPTIONAL FORMS

(1) पाओल *páöl*, पौलिऐ (क) *pauliai(k)*, पौलै(क) *paulai(k)*, पौली *paulí*, *&c.*
(2) पौलेँ *paulē*, पौलैँ *paulãi*, पौलहक *paul'hak*, *&c.*
(4) पौलकै(क) *paul'kai(k)*, पौलकौ(क) *paul'kau(k)*.

In older Maithilí poetry we sometimes find पैल *pail* instead of पौल *paul*, but this never occurs nowadays: thus पैलहुँ *pailah'ñ*, &c. The verb आएब *áēb*, "to come," however, still makes its 3rd P. Non-Hon. आएल *áēl* instead of आओल *áöl*.

PERFECT.

पौलेँ छी *paulē chhí*, or पौलहुँ अछि *paulah'ñ achh'*.

PLUPERFECT.

पौलेँ छलहुँ *paulē chhalah'ñ*

NOTE. It is important to note the conjugation of पाएब *páēb* carefully; as it is the model of a large class of verbs, principally actives and causals.

The explanation of the seeming irregularities in the conjugation of पाएब *páeb* is this. As explained in § 166, the letter व *v* (or ब *b*) may be inserted after the final vowel of the root, before all vowel terminations. In the case of पा *pá* this is generally done, and hence we get a root पाव *páv* which forms the real conjugational base. The rules in § 148 for the shortening of the long vowel of the root apply in this conjugation. Before त *t* and ल *l*, immediately following, this व is liable to be changed to ओ *ŏ*, which *ŏ* it may be stated here is pronounced short, which accounts for the forms पाओल *páŏl* and पाओत *páŏt*, in which the *á* remains long in spite of § 148. 1, according to which if *o* was a long vowel we should expect पओल *paol*, and पओत *paot*. When, however, the आ *á* is shortened to अ *a* under § 148.2 or 3, this latter coalesces with a following ओ *ŏ*, and the two together become the diphthong औ *au*. Thus we get, in order, for the 1st. sing. Past पवलहुँ, *pav'lah'u*, पओलहुँ *paŏlah'ũ* and finally पौलहुँ.

The forms containing पै *pai*, are those in which the euphonic letter व *v* (or ब *b*) has not been inserted. In these the आ *á* of the root is first shortened under § 148.2 or 3, and then, combining with a following इ *i*, forms ऐ *ai*. Thus 1st Retro. Conditional is पा + इतहुँ *pá* + *itah'ũ* ; then (§ 148) प + इतहुँ *pa* + *itah'ũ*, then finally पैतहुँ *paitah'ũ*. In the Future and Past an इ *i* has been inserted first for the sake of euphony. In the Retrospective Conditional this has not been necessary.

Here it must be noted that the ए *ĕ* and ओ *ŏ*, which we find in the conjugation of verbs with vocalic roots, are always pronounced short, and do not affect a preceding long vowel. They will, hence, always hereafter be marked short; thus *ĕ*, *ŏ*.

CHAPTER XIII.

THE PASSIVE VOICE.

§ 168. As in other Neo-Aryan languages the Passive voice is formed by subjoining the conjugated verb जाएब *jáĕb* "to go", to the past participle. This participle is liable to inflection as to gender, in which respect it agrees with the subject of the verb, but in other respects it remains unaltered. Thus देखल जाएब *dekhal jáĕb* means "to be seen."

§ 169. It is needless therefore to conjugate the passive verb throughout. As however जाएब *jáĕb* is irregular in some of its forms, I here conjugate it in its more usual tenses.

§ 170. जाएब *jáĕb* "to go".

Root,	जा *já*.
Present Participle,	जाइत *jáit*.
Past Participle,	गेल *gel*.

PROSPECTIVE CONDITIONAL.

	Honorific.	*Non-Honorific.*
1st. P.	जाई *jái,*	——
2nd. P.	——	जाह *jáh,*
3rd P.	जाथि *játh',*	जतौ *jatau.*

FUTURE.

1st. P.	जाएब *jáeb,*	——
2nd. P.	——	जैबह *jaibah,*
3rd. P.	जैताह *jaitáh,*	जाएत *jáĕt.*

IMPERATIVE.

1st. P.	जाऊ *jáú,*	——
2nd. P.	——	जाह *jáh,*
3rd. P.	जाथु *játh',*	जतौ *jatau.*

RETROSPECTIVE CONDITIONAL.

1st. P.	जैतऊँ *jaitah'ñ,*	——
2nd. P.	——	जैतह *jaitah',*
3rd. P.	जैतथि *jaitath',*	जाइत *jáit.*

PRESENT. जाइत छी *jáit chhí, &c.*

IMPERFECT. जाइत छलऊँ *jáit chhalah'ñ, &c.*

PAST.

1st. P.	गेलऊँ *gĕlah'ñ,*	——
2nd. P.	——	गेलाह *gĕláh,*
3rd. P.	गेलाह *gĕláh,*	गेल *gel.*

PERFECT. गेलऊँ अछि *gĕlah'ñ achh', &c.*

PLUPERFECT. गेल छलऊँ *gel chhalah'ñ, &c.*

CHAPTER XIV.

IRREGULAR VERBS.

§ 171. Besides जाएब *jáĕb*, already conjugated, I have noted the following important verbs as irregular.

करब *karab*,	"to do",
धरब *dharab*,	"to seize", "place".
आएब *áĕb*,	"to come",
देब *deb*,	"to give",
लेब *leb*,	"to take",
होएब *hoĕb*,	"to become",
मरब *marab*,	"to die".

It is not necessary to conjugate them throughout, and the following tables, showing their principal parts, must suffice.

§ 172. *a.* करब *karab*, "to do".

Present Participle, करैत *karait*,

Past Participle, कैल *kail*,

1st. P. Honorific Past, हम कैलहुँ *ham kailah'ñ*,

3rd. P. Non-Honorific Past, ओ कैलक *o kailak*.

Note also the conjunctive participle कै कहुँ *kai kah'ñ*, or कय कहुँ *kay kah'ñ*, "having done".

b. धरब *dharab* "to seize", "place", is conjugated exactly like करब *karab*, "to do", only substituting ध *dh* for क *k* throughout.

§ 173. आएब *áĕb*, "to come".

Present Participle,	अवैत *avait*,
Past Participle,	आएल *áĕl*,

3rd. P. Non-Honorific Past, ओ आएल *o áĕl*.

§ 174. *a.* देब *deb*, "to give".

Present Participle, दैत *dait*,

Past Participle, देल *del*,

1st. P. Honorific Past, हम देल *ham del*.

(देलहुँ *dĕlah'ñ* is seldom used)

3rd. P. Non-Honorific Past, ओ देलक *o delak*.

Note, that the 2nd person Non-Honorific Imperative, is दह *dah*, and not देअह *deah* ; also दहक *dahak*, दहीक *dahík*.

b. लेब *leb* "to take", is conjugated exactly like देब *deb*, "to give", only substituting ल *l* for द *d* throughout.

Note that the 2nd Person Non-Honorific Imperative is लह *lah*, and not लेअह *leah* ; also लहक *lahak*, and लहीक *lahík*.

§ 175. मरब *marab*, "to die".

Present Part., मुइत *muit*, or मरैत *marait*.

Past Part., मुइल *muil*, or मरल *maral*.

1st P. Hon. Pros. Cond., मरी *marí*.

,, Future, मरब *marab*.

,, Imperative, मरू *marú*.

,, Retrosp. Cond., मुइतहुँ *muitah'ñ*, or मरितहुँ *maritah'ñ*.

,, Present, मरैत छी *marait chhí*.

,, Past, मुइलहुँ *muilah'ñ*, or मरलहुँ *mar'lah'ñ*.

Adverbial Participle, मुइतहिँ *muitah'ñ*.

§ 176. होएब *hoĕb*, or हैब *haib*, "to become,"

Present Part., होएत *hŏait*, or होइत *hoit*.

Past Part., भेल *bhel*.

1st . Hon. Pros. Cond., होई *hoí.*

,, Future, हैब *haib,* (N. B. The form होईग *hoíga* is not used.)

,, Imperative, होऊ *hoú*

,, Retrospect Cond., होइतहुँ *hŏitah'n̄.*

,, Present, होएत छी *hŏait chhí,* or होइत छी *hoit chhí.*

,, Past, भेलहुँ *bhĕlah'n̄.*

,, Perfect, भेल छी *bhel chhí,* or भेलहुँ अछि *bhĕlah'n̄ achh'.*

Conjunctive participle, भै कँ *bhai kă,* भै कैँ *bhai kāi.*

Adverbial participle, होइतहिँ *hŏitah'n̄.*

CHAPTER XV.

THE FORMATION OF ACTIVE AND CAUSAL VERBS.

§ 177. As in other *Gauḍian* languages the neuter verb in Maithilí can be made active, and the active verb, causal.

§ 178. The active verb is generally formed by adding ° आव *áv* to the root, and the causal ° वाव *váv,* but there are many exceptions. The roots thus formed are then conjugated like the root पाव *páv,* the optional form of the root पा *pá,* 'obtain'. See § 167. Note.

The following are examples of the regular adoption of the rule.

NEUTER.	ACTIVE.	CAUSAL.
उठब *uṭhab,* to rise,	उठाएब *uṭháëb,* to raise,	उठवाएब *uṭh'váëb,* to cause to rise.

गिरब *girab*, to fall,	गिराएब *giráëb*, to fell,	गिरवाएब *gir'váëb*, to cause to fell.
चढ़ब *charhab*, to ascend,	चढ़ाएब *charháëb*,	चढ़वाएब *charh'váëb*.
पकब *pakab* to ripen,	पकाएब *pakáëb*,	पकवाएब *pak'váëb*.
बजब *bajab*, to sound, to speak,	बजाएब *bajáëb*,	बजवाएब *baj'váëb*.
लगब *lagab*, to be applied,	लगाएब *lagaëb*,	लगवाएब *lag'váëb*.
पिघलब *pigh'lab*, to melt,	पिघलाएब *pigh'láëb*.	पिघलवाएब *pighal'váëb*
लटकब *laṭ'kab*, to hang,	लटकाएब *laṭ'káëb*,	लटकवाएब *laṭak'váëb*.

§ 179. Monosyllabic roots containing a long vowel, generally shorten it in the active and causal forms; but unlike Hindí, the *guṇa* diphthongs ° ए-*e*, and ° ओ-*o*, are not shortened to their simple vowels ° इ-*i*, and ° उ-*u* respectively; they are, instead pronounced short, like *ĕ*, & *ŏ*: thus :—

NEUTER.	ACTIVE.	CAUSAL.
जागब *jágab*, to be awake,	जगाएब *jagáëb*,	जगवाएब *jag'váëb*.
बजब *bájab*, to speak,	बजाएब *bájaëb*,	बजवाएब *baj'váëb*.
भीजब *bhíjab*, to be wet,	भिजाएब *bhijáëb*,	भिजवाएब *bhij'váëb*.
घूमब *ghúmab*, to go round,	घुमाएब *ghumáëb*,	घुमवाएब *ghum'váëb*.
But		
डोलब *ḍolab*, to be shaken,	डोलाएब *ḍŏláëb*,	डोलवाएब *ḍŏl'váëb*
लेटब *leṭab*, to lie down,	लेटाएब *lĕṭáëb*,	लेटवाएब *lĕṭ'vaëb*.

NOTE, that, unlike Hindí, monosyllabic roots, consisting of a consonant and a long vowel, do not form actives in ° ला *lá*, or causals in ° लवा-*l'vá*.

§ 180. The following are examples of monosyllabic roots of active verbs, which become doubly active and causal.

ACTIVE.	DOUBLY ACTIVE.	CAUSAL.
देब *deb*, to give,	दिआएब *diáĕb*,	दिअवाएब *diaváĕb*.
धोअब *dhoab*, to wash,	धोआएब *dhŏáĕb* or धोबाएब *dhŏbáĕb*	धोअवाएब *dhŏaváĕb*.
पिअब *piab*, to drink,	पिआएब *piáĕb* or पिबाएब *pibáĕb*,	पिअवाएब *piaváĕb*.
सीखब *síkhab*, to learn,	सिखाएब *sikháĕb*,	सिखवाएब *sikh'váĕb*.

Note also here,

जिअब *jiab*, to live,	जिआएब *jiáĕb*,	जिअवाएब *jiaváĕb*.

§ 181. Many neuter verbs with a short vowel in the root simply lengthen it to form the active, and form the causal regularly with ° वा-*vá* ; thus,

NEUTER.	ACTIVE.	CAUSAL.
कटब *kaṭab*, to be cut,	काटब *káṭab*,	कटवाएब *kaṭ'váĕb*.
गड़ब *gaṛab*, to be buried,	गाड़ब *gáṛab*,	गड़वाएब *gaṛ'váĕb*.
मरब *marab*, to die,	मारब *márab*,	मरवाएब *mar'váĕb*.
Wanting	पालब *pálab*, to rear,	पलवाएब *pal'váĕb*.
Wanting	लादब *ládab*, to load,	लदवाएब *lad'váĕb*.
BUT,		
खुलब *khulab*, to be open,	खोलब *kholab*,	खोलवाएब *khŏl'váĕb*.

§ 182. The following are irregular.

NEUTER.	ACTIVE.	CAUSAL.
छूटब *chhúṭab*, to go off,	छोड़ब *chhoṛab*,	छोड़वाएब *chhŏṛ'váĕb*.
टूटब *ṭúṭab*, to be broken,	तोड़ब *toṛab*,	तोड़वाएब *tŏṛ'váĕb*.
फटब *phaṭab*, to be rent,	फाड़ब *pháṛab*,	फड़वाएब *phaṛ'váĕb*.
अटब *aṭab*, to be stopped,	अड़ाएब *aṛáĕb*,	अड़वाएब *aṛ'váĕb*.

बिकब *bikab*, or बिकाएब *bikáĕb*, to be sold,	बेचब *bechab*, बेचवाएब *běch'váĕb*.
रहब *rahab*, to remain,	राखब *rákhab*, रखवाएब *rakh'váĕb*.

§ 183. Amongst others, the following verb takes the causal form, but does not use it in a causal, but only in an active sense ; the Causal form thus becomes an optional form of the Active.

SIMPLE VERB.	ACTIVE.
कहब *kahab*, to say,	कहाएब *kaháĕb*, or कहवाएब *kah'váĕb*.

CHAPTER XVI.

COMPOUND VERBS.

§ 184. The compound verbs in Maithilí, do not range themselves under such a simple classification as we find in Hindí. We find the root appearing not only in its simple form, but in other modified forms, for the use of which it is difficult to give any definite rule. I shall adopt as far as possible the classification of Hindí grammars, and hence commence with

A. *Compound Verbs formed from the root, whether simple or modified.*

I. INTENSIVES. Examples are,

§ 185. (*a*) From the simple root ;

खा जाएब *khá jáĕb*, to eat up.

पि जाएब *pi jáĕb*
पि लेब *pi leb*, to drink up.

हो जाएब *ho jáĕb*, to become.

हो रहब *ho rahab*, to be.

हेड़ा देब *herá deb*, to lose

Note here a kind of passive formed with पड़ब *paṛab*, to fall. Example, मार पड़ब *már paṛab*, to be beaten.

§ 186. (*b*) *From the modified root.*

पुकारि उठब *pukár' uṭhab*, to call out.

बनि जाएब *ban' jáĕb*, to be made.

काटि डारब *káṭ' ḍárab*, to cut off.

राखि लेब *rákh' leb*, to lay by.

सूति रहब *sút' rahab*, to sleep on.

चलि जाएब *chal' jáĕb*, to depart.

§ 187. II. POTENTIALS. Always formed from the modified root. Examples are,

चलि सकब *chal' sakab*, to be able to move.

बाजि सकब *báj' sakab*, to be able to speak.

लिखि सकब *likh' sakab*, to be able to write.

दै सकब *dai sakab*, to be able to give.

लै सकब *lai sakab*, to be able to take.

जाए सकब *jáĕ sakab*, to be able to go.

§ 188. III. COMPLETIVES. Sometimes formed from the simple, and sometimes from the modified root. Examples are,—

खा चुकब *khá chukab*, to have done eating.

दै चुकब *dai chukab*, to have done giving.

मारि चुकब *már' chukab*, to have done beating.

The foregoing modified form of the root, is really an additional form of the conjunctive participle, corresponding to the *Bangálí* conjunctive participle in °इया. Thus काटि *káṭ'* appears to correspond to the *Bangálí* काटिया *káṭiyá*.

B. *Compound verbs formed with the Verbal Noun.*

§ 189. The following observations have been inserted here, although they might, perhaps, be more logically placed in the Chapter on Simple Verbs.

There are three forms of the Verbal noun. All these can be regularly declined like nouns, but, unlike nouns, they have an oblique form, differing from the nominative, to which the case terminations are attached.

(1.) The first form is that already given in this grammar, ending in ब *b*; as देखब *dekhab*, "seeing." Its oblique form ends in बा *bá*, as देखबा सँ *dĕkh'bá** *sā* "from seeing," देखबाक *dĕkh'bák*, "of seeing," &c.

(2.) The Second form is made by substituting ल *l* for ब *b* in the first form, as देखल *dekhal*, oblique form देखला *dĕkh'lá*. Its nominative or direct therefore generally, but not always (e. g. not in the case of जाएब *jáĕb* "to go") is the same as that of the Past Participle. Sometimes, however, in the case of irregular verbs, the form of the Past Participle is used by the ignorant instead of the real form of the verbal noun. Thus, the proper form of this variety of the verbal noun of the verb जाएब *jáĕb* "to go" is जाएल *jáĕl*, but the vulgar sometimes say गेल *gel*, which is the form of the Past Participle. In the case of verbs whose roots end in आ *á*, the observations in § 168 (note) apply; so that we find forms like पावल *pával*, and पौला में *paulá mē*, beside forms like पाएल *páĕl* and पैला *pailá*.

(3.) The third form of the verbal noun does not occur in the direct form at all. It is only found in the oblique form, which is made by adding अ *a or* ऐ *ai* to the root. Thus Acc. Sing. देख कें *dekha* (not *dekh*) *kē*, or देखै *dekhăĭ kē*: and so on. The final ऐ *ai* is pronounced short thus *dekhăĭ* and does not affect a previous long vowel; cf. § 148. and § 167 (note). Thus we have the verbal noun पठावै *paṭhávăĭ*, while the Present Participle in the Present tense is पठवै (छी) *paṭhavai* (*chhí*) of पठाएब *paṭháeb*, "to send". When the root of the verb ends in आ *á*, this form of the verbal nouns ends either in आवै *ávăĭ* as above, or in ए *ĕ*, as जाए *jáĕ*, पाए *páĕ*. In irregular verbs, as in the second variety, the vulgar use forms connected with the past participle, instead of the regular ones, as मुऐ *muăĭ*, instead of मरै *marăĭ* from मरब *marab*, "to die."

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* See addenda.

§ 190. I. DESIDERATIVES, which are formed in two ways.

(*a*) By the phrase इच्छा अछि *ichchhá achh'* meaning "there is a desire" following the genitive of the first form of the verbal noun in ब *b*.

(*b*) By the accusative, genitive, or simple oblique third form of the verbal noun with the verb चाहब *cháhab*, to wish :— Examples—

(*a*) देखबाक इच्छा अछि *dĕkhabák ichchhá achh'*, there is a desire of seeing, *i e.* I wish to see.

With this phrase, compare the Bangálí, देखिबार इच्छा आछि *dekhibár ichchhá áchhi.*

(*b*) हम देख कें चहैछी *ham dekha kẽ chahaichhí*, I wish to see.
ओ बाज चहैअछि *o bája chahaiachh'*, he wishes to speak.

घड़ी बाजै चहैछलि *ghaṛi bájăĭ chahaichhal'*, the clock was about to strike.

ओ जाए चहैछथि *o jáĕ chahaichhath'*, he wishes to go.

ओ मरै (vulgarly मुऐ) चहैत अछि *o marăĭ* (vulgarly *muăĭ*) *chahait achh'*, he is at the point of death.

एहि पोथी कें पढ़क चाही *ĕh' pothí kẽ paṛhak cháhí*, one should read this book.

तोहरा ओतय जाएक *(or* जाए *or* जाए कें*)* चाही *tŏh'rá otay jáĕk (or jáĕ or jáĕ kẽ) cháhí*, you should go there.

§ 191. II. PERMISSIVES are also formed from the third form of the verbal noun. Examples are ;—

जाए देब *jáĕ deb*, to allow to go.

कहै देब *kahăĭ deb*, or } to allow to speak.
कह देब *kaha* (not *kah*) *deb* }

ओ ओकरा खाए देलकैक *o ŏk'rá kháĕ dĕl'kaik*, he allowed him to eat.

§ 192. III. ACQUISITIVES, are also formed from the same form. Example.

ओ उठै नहिँ पाबथि *o uṭhăĭ nah'ñ pábath'*, do not let him rise.

§ 193. III. FREQUENTATIVES, are formed with the direct form of the second variety of the verbal noun in ल *l*. Examples.

आएल करब *áĕl karab*, to come frequently.

कैल करब *kail karab*, to do frequently,

ओ कहल करैअछि *o kahal karaiachh'*, he speaks frequently

ओ जाएल करैअछि *o jáĕl karaiachh'*, he goes frequently.

§ 194. IV. INCEPTIVES. In Maithilí these are formed with the oblique form of the third variety of the verbal noun. Examples are

कह लागब *kaha (*not pronounced *kah) lágab*, to begin to speak.

दीअ लागब *día lágab*, to begin to give.

मारै लागल *márăĭ lágal*, he began to beat.

बाघ खाए लागल *bágh kháĕ lágal*, the tiger began to eat.

C. *Compound verbs formed from the present participle.*

These are, as in Hindí, Continuatives and Staticals. Examples are;—

§ 195. I. CONTINUATIVES.

लिखैत जाएब *likhait jáĕb*, to continue writing.

पढ़ैत जाएब *paṛhait jáĕb*, to continue reading.

बोलैत जाएब *bŏlait jáĕb*, to continue speaking.

जाइत रहब *jáit rahab*, to continue going.

पवैत आएब *pavait áëb*, to go on finding.

पानि बहैत जाइअछि *páni bahait jáiachh'*, the water keeps flowing away.

नदी केर धार बहैत रहैअछि *nadí ker dhár bahait rahaiachh'*, the stream of the river keeps flowing on.

§ 196. II. Staticals.

कनैत चलब *kanait chalab*, to go along crying.

गबैत आएब *gabait áëb*, to come singing.

एक स्त्री गवैत अवैछलि, *ek strí gavait avaichhal'*, a woman was coming singing.

§ 197. D. *Other compound verbs.*

I. The following idiom with the Past Participle, making quasi statical verbs may be noted,

पानि बहल् जाइत अछि *páni bahal jáit achh'*, the water keeps flowing away.

एक बाघ पड़ल फिरैछल *ek bágh paṛal phiraichhal*, a tiger was prowling about.

In connection with this note that the phrase चला जाना *chalá jáná*, "to go away", so common in Hindí, has no counterpart in Maithilí, the Intensive compound being used instead.

II. The Maithilí equivalent to the Hindí ले आना *le áná*, to bring, is आनब *ánab*, and to the Hindí ले जाना *le jáná*, to take away, is the anomalous लेनें जाएब *lenẽ jáëb.*

PART IV.

INDECLINABLES.

CHAPTER XVII.

ADVERBS, PREPOSITIONS, AND CONJUNCTIONS.

§ 198. Henceforth I shall not transliterate. It was necessary to do so in the case of verbs, but Indeclinable words, as a rule, show their own pronunciation.

The following lists of ADVERBS have been collected.

§ 199. I. ADVERBS OF TIME.

एखन	*Now.*
तखन तहिआ	*Then.*
कखन कहिआ	*When?*
जखन जहिआ	*When.*
आइ	*Today.*
काल्हि	*Yesterday, tomorrow.*
आइ काल्हि	*Now-a-days.*
परसू	*The day before yesterday*, or *the day after-tomorrow.*
प्रतिदिन अनुदिन सभदिन	*Every day.*
सदा सर्वदा	*Always.*
नित्य	*Continually.*

सबेर प्रातःकाल अत्युख भोर	*Early, at dawn.*
कदाचित कदापि कहिओ	*Perhaps, sometimes.*
निदान अन्त अन्तकाल	*At last.*
बेरिबेरि बारंबार	*Often.*
शीघ्र	*Quickly.*
तात्काल तत्क्षण	*Instantly.*
पश्चात् पाछा	*Afterwards.*
फेरि	*Again.*
एकबेरि	*Once.*

§ 200. II. ADVERBS OF PLACE.

एतय	*Here.*	तेम्हर	*Thither.*
ओतय	*There.*	लगपास	*On all sides.*
कतय, कहाँ	*Where?*	समीप	*Near.*
जतय, जहाँ	*Where.*	एहिकात	*On this side.*
ततय, तहाँ	*There.*	ओहिकात	*On that side.*
एम्हर	*Hither.*	सर्वत्र सभठाम	*Everywhere*
ओम्हर	*Thither.*		
केम्हर	*Whither?*	पार	*Across.*
जेम्हर	*Whither.*	निकट	*Near.*

§ 201. III. ADVERBS OF MANNER.

अकस्मात् अचक में	*Accidentally.*	वृथा व्यर्थ नाहक	*In vain.*
अति	*Very.*	एना	*Thus.*
पृथक फराक	*Separately.*	कोना, कोन तरहेँ	*How?*
झटपट झटद	*At once.*	जेना, जैँ तरहेँ	*As.*
तथापि तैओ	*Nevertheless*	तेना, तैँ तरहेँ	*So.*
यद्यपि जैओ	*Although.*	सत्य	*Truly.*
		सहज, सहजेँ, सहज में	*Gratis.*
		इत्यादि, इत्यादि,	*Etcetera.*

§ 202. IV. ADVERBS OF AFFIRMATION AND NEGATION.

हँ	*Yes.*
निश्चय	*Certainly.*
निस्सन्देह	*Doubtlessly.*
अवश्य	*Necessarily.*
नहिँ न	*No, not.*
जनु	*No, do not.*

§ 203. The following are examples of COMPOUND ADVERBS.

कहिओ कहिओ	*Sometimes.*
नऊँ नऊँ सुस्ते सुस्ते	*Gently.*
एखन धरि	*Till now, yet.*
कहिआ धरि कखन धरि	*Till when?* *How long?*
कहिओ नहिँ	*Never.*
दुनुदिश	*On both sides, all round.*
एहन ओहन	*Indifferently.*
जौँ कहिओ	*Whenever.*
और कतऊ	*Elsewhere.*
कतहु नहिँ	*Nowhere.*
एतय धरि	*Hitherto.*
नहिँ तँ	*If not, else.*
कहिओ न कहिओ	*Sometime or other.*
कतहु न कतहु	*Somewhere another.*
जखन न तखन	*now and then.*
एना नेँ एना	*Somehow or other.*

§ 204. The following are examples in which adverbs take the signs of cases after them.

एखनुक बेरि नीक छैक *Now is the best time.* (Lit. *The time of now is good*).

तहिआ सँ आइ भेट भेल अछि *I have not seen you since then till today.* (Lit. *From that time today a (first) meeting has occurred.)*

निदान कँ ऐलाह *At last he came.*

अन्तकाल में ज्ञान भेलैन्हि *At length he came to his senses.*
ओ आइ कें काल्हि कहैत छथि *He puts off from today to tomorrow.* (Lit. *He calls tomorrow today.*)

PARTICLES OF EMPHASIS.

§ 205. These are ई and ही or हीँ, *only, even,* and ओ and हु or हुँ, *also, even.* They are always used enclitically, and when any of them is added to a word ending in आ, that आ is omitted. Examples, हमरी *mine only* (हमर + ई), or *me only* (हमरा + ई); हमरो or हमरहुँ *mine also*, or *me also.* उतर, *a reply,* उतरी, *even a reply.* अपनहुँ, *even one's own.*

PREPOSITIONS.

§ 206. The following is a list of the more usual Prepositions.

आगाँ	*Before.*
पाछाँ	*Behind.*
ऊपर	*Above.*
नीचाँ	*Beneath.*
भीतर	*Within.*
संमुख सोझाँ	*Facing.*
साक्षात	*Before.*
लेल	*For, on acconnt of.*
बिनु, बिनाँ	*Without, Except.*
बाहर	*Out.*
संग	*With.*

The above all govern the genitive case.

CONJUNCTIONS.

§ 207. The following are the more useful.

आओर or ओ	*And.*
कि	*That.*
औ	*Else, even.*
तँ	*Then.*
की…की	*Either…or.*
परंतु	*But.*
योँ	*If.*

§ 208. INTERJECTIONS, see § 24. Others as in Hindí.

ADDENDA ET CORRIGENDA.

INTRODUCTION.

I withdraw the remarks on Page 2 concerning the tract over which Maithilí is spoken. In Champáran a form of Bhojpúrí is spoken, with a strong Maithilí tendency, but not sufficiently strong to entitle me to class the language as a sub-dialect of the latter. We must therefore deduct the figures for Champáran from the foot note, but at the same time we must add the figures for the whole of South Munger and South Bhágalpúr, for the Baṛh Subdivision of Patna, and for part of Púrníyá, where subsequent investigations have shown me that Maithilí in greater or less purity is spoken.

The corrected figures, therefore, for the foot note will run as follows.

Muzaffarpúr	23,15,267
Darbhangá	21,03,337
Munger	18,16,894
Bhágalpúr ... about	20,00,000
Araríá Sub-division of Púrníya	3,05,040
Baṛh „ Patna	2,47,076
TOTAL, ...	87,87,614

§ 5. This Grammar went to the Printer more than a year and a half ago. When the manuscript was despatched, with the exception of Mr. Beames' notes on the Bhojpúrí dialect there was no other philological work from which I could obtain any help regarding the Bihár dialects. Under the circumstances, I purposely avoided mentioning certain facts which I had noticed, but which, mistrusting my own uncorroborated ear, I thought demanded consideration and reflection before stating. One of these, thanks to Dr. Hœrnle's Gauḍian Grammar, has since become one of the commonplaces of Eastern Hindí Grammar. I allude to the existence of the short vowels ĕ, ŏ, ăĭ, and ăŭ. These vowels have no symbol in the alphabets of Bihár, being represented like their long congeners as follows; ए *e* or ĕ, ओ *o* or ŏ, ऐ *ai* or ăĭ, औ *au* or ăŭ. The fact is, that just as the simple vowels have each a short and a long form viz: *a* and *á*, *i* and *í* &c, so also the diphthongs have each a short and a long form, *viz: ĕ* and *e*, *ŏ* and *o*, *ăĭ* and *ai* and *ăŭ* and *au*. Instances of these short diphthongs will be found in § 167 (note) ; and as diphthongs are liable to exactly the same rules as regards shortening as the simple vowels, the rules in § 148 apply to them also. Hence, subsequently to § 167, I have marked short diphthongs wherever they occur. Note that the words एहि, this, and ओहि, that, (§§ 85 & 86) are pronounced *ĕh'* and *ŏh'*.

The rules as regards shortening of vowels and diphthongs in verbal inflections have been given by me in § 148 ; but another important rule, first given by Dr Hœrnle, for the shortening of vowels and diphthongs in words other than verbs, must be given here. As adapted to this Maithilí Grammar it is as follows :

(1) As regards आ *á*, this vowel is always shortened if it comes in the antepenultimate syllable or earlier in a word. Thus in the word चाउर *cháur*, rice, the *á* is long, because *á* is only in the penultimate syllable ; but the longer form (see § 17) is चउरुआ *chaŭruá* (or contracted चौरुआ *chauruá*) in which the *a* is short, as it is in a syllable earlier than the antepenultimate. Again there is रामा *Rámá* a proper name, in which the first *á* is long, but in the vocative it is रमवा *ram'vá*, in which the first *a* is shortened, it being in the antepenultimate syllable.

(2) As regards other vowels and diphthongs they are liable to be shortened in the antepenultimate only if a consonant, which is not euphonic य *ya* or व *wa*, follow. If, however, in a syllable earlier than the antepenultimate, they are liable to be shortened no matter whether a consonant or a vowel follow. Thus ओ *o*, this, makes its genitive ओकर *okar*, with a long *o*, but its accusative is ओकरा *ŏk'rá* with a short *ŏ*, as this *ŏ* falls in the antepenultimate and is followed by a consonant. So also the *ĕ* in नेनिआ (see § 34) *nĕniá* is short.

In counting syllables for applying this rule, it must be remembered that a final silent consonant (see § 7) must not be counted a syllable, as it is counted in § 148. Thus ओकर *okar* is only two syllables, while ओकरा *ŏk'rá* is three syllables.

There is only one exception to this rule,—it is that the final syllable एँ *ẽ* of the instrumental case is not considered as part of the word, but as a separate word. Hence we have पानिएँ *pániẽ*, and not पनिएँ *paniẽ* with the *a* short. The word, however, though *written pániẽ* is *pronounced paniẽ* with the *a* short.

§ 70. An optional form of the instrumental singular of ई *ī*, "this", is ए *ĕ*. I have not met any corresponding form for ओ *o*, "that".

§ 85. For एहि *ĕh'*, एह *ĕh* and ऐह *ăïh* are sometimes used.

§ 86. Similarly for ओहि *ŏh'*, we find ओह *ŏh*, and औह *ăŭh*.

§ 104. NOTE, as to spelling, that verbal forms containing ऐ *ai*, are frequently written with अइ *aï*. Similarly verbal forms in औ *au* are frequently written with अउ *aü*. So that देखैत *dĕkhait* is sometimes written देखइत *dĕkhaït*, and देखिऔ *dĕkhiau*, sometimes देखिअउ *dekhiaü*.

In poetry ऐ *ai* when final is frequently written अय *ay*: e.g. देखिऐ *dĕkhiai* is written sometimes देखिअय *dĕkhiay*.

§ 111. I have omitted a common form for "he is", अहि *ah'*. No other forms from this root are, so far as my experience goes, in use.

§ 117. Add present participle अछैत *achhait* "existing"

§ 132. The forms of the prospective conditional may also be used for the imperative, and *vice versa*.

In poetry the prospective conditional is very commonly used as a simple present. When this is the case, the third singular non-honorific may have also the following additional forms, देख *dekh*, देखे *dekhe*, देखु *dekh'*, देखै *dekhai* (or देखय *dekhay*), and देखए *dĕkhaai*. So also in intransitive verbs.

§ 133. 3rd Future Hon.—An optional form for this person is देखथु *dekhath'*, frequently, however, written देखतह *dĕkhat'h'*.

§ 167. *Past Tense.*—The use of the dipthongs *ai* and *au* in this tense is regulated by the following rules.

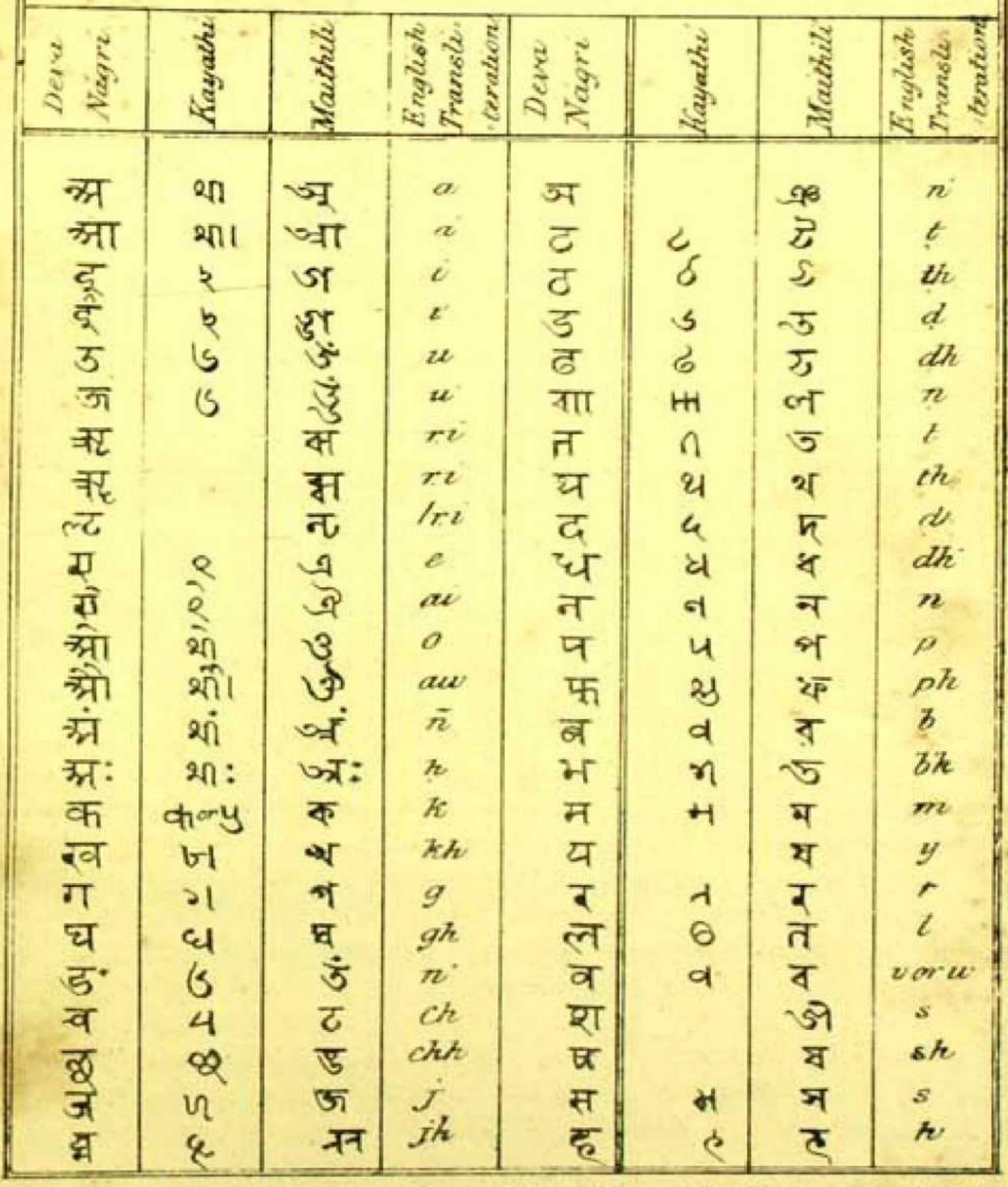
(1) Transitive verbs (including causals) generally take *au*, and so also does गाएब *gáĕb*, "to sing". Hence we have in the first person पौलहुँ *paulah'ñ*, "I obtained", गौलहुँ *gaulah'ñ*, "I sang", चढ़ौलहुँ *chaṛhaulah'ñ*, "I caused to ascend". The past participles of these verbs are पाओल *páŏl*, गाओल *gáŏl*, and चढ़ाओल *chaṛháŏl*. The principal exception which I have met is the verb खाएब *kháĕb*, "to eat", which makes its past tense खैलहुँ *khailah'ñ*, and its past participle खाएल *kháĕl*: the form खाओल *kháŏl*, I have, however, met, once or twice, though said to be incorrect.

(2) Intransitive verbs as a rule use the diphthong *ai*. Thus अघाएब *agháĕb*, "to be satiated", *past part.* अघाएल *agháĕl*, and its 1st pers. past, अघैलहुँ *aghailah'ñ*, "I was satiated", so also घबड़ाएल *ghab'ṛáĕl*, "confused," आएल *áĕl*, "come", and हड़बड़ाएल *haṛ'baṛáĕl*, "agitated", from the intransitive verbs घबड़ाएब *ghab'ṛáĕb*, आएब *áĕb*, and हड़बड़ाएब *haṛ'baṛáĕb* respectively.

§ 189-3. The verbal noun (oblique form in ऐ *ăī*) of the verbs देब *deb*, to give, and लेब *leb*, to take, inserts an म् *m*, thus, देमै *demăī*, लेमै *lemăī*, *gen.* देमैक *demăīk* &c. Verbs whose root ends in इ *i*, insert a ब *b* in this form: E.g. पिबै *pibăī* from पिअब *piab*, to drink.

See § 4 APPENDIX No. 1.

Table shewing the various alphabets used in Mithila.

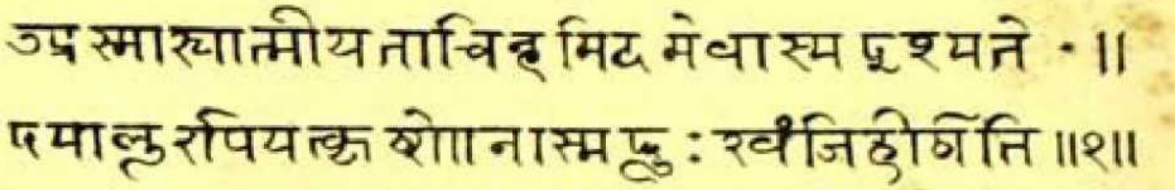


Deva Nagri	Kayathi	Maithili	English Transliteration	Deva Nagri	Kayathi	Maithili	English Transliteration
अ	𑂃	𑒁	a	ञ		𑒘	n'
आ	𑂄	𑒂	á	ट	𑂗	𑒙	ṭ
इ	𑂅	𑒃	i	ठ	𑂘	𑒚	ṭh
ई	𑂆	𑒄	í	ड	𑂙	𑒛	ḍ
उ	𑂇	𑒅	u	ढ	𑂛	𑒜	ḍh
ऊ	𑂈	𑒆	ú	ण	𑂝	𑒝	ṇ
ऋ		𑒇	ri	त	𑂞	𑒞	t
ॠ		𑒈	rí	थ	𑂟	𑒟	th
ऌ		𑒉	lri	द	𑂠	𑒠	d
ए	𑂉	𑒋	e	ध	𑂡	𑒡	dh
ऐ	𑂊	𑒌	ai	न	𑂢	𑒢	n
ओ	𑂋	𑒍	o	प	𑂣	𑒣	p
औ	𑂌	𑒎	au	फ	𑂤	𑒤	ph
अं	𑂃𑂁	𑒁𑓀	n̄	ब	𑂥	𑒥	b
अः	𑂃𑂂	𑒁𑓁	ḥ	भ	𑂦	𑒦	bh
क	𑂍	𑒏	k	म	𑂧	𑒧	m
ख	𑂎	𑒐	kh	य		𑒨	y
ग	𑂏	𑒑	g	र	𑂩	𑒩	r
घ	𑂐	𑒒	gh	ल	𑂪	𑒪	l
ङ	𑂑	𑒓	n'	व	𑂫	𑒫	v or w
च	𑂒	𑒔	ch	श		𑒬	s
छ	𑂓	𑒕	chh	ष		𑒭	sh
ज	𑂔	𑒖	j	स	𑂮	𑒮	s
झ	𑂕	𑒗	jh	ह	𑂯	𑒯	h

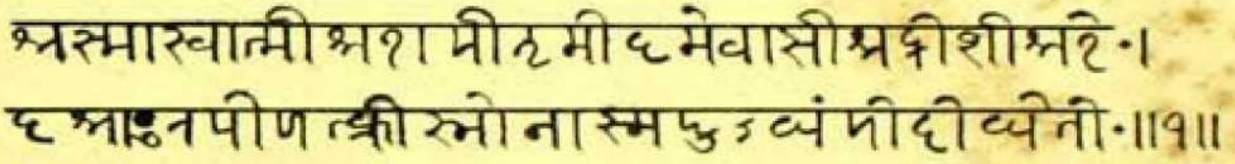
* The semi-vowel य is not used by Kayasths in writing Maithili, the vowel इ being substituted for it.

See § 4 APPENDIX No. 1.

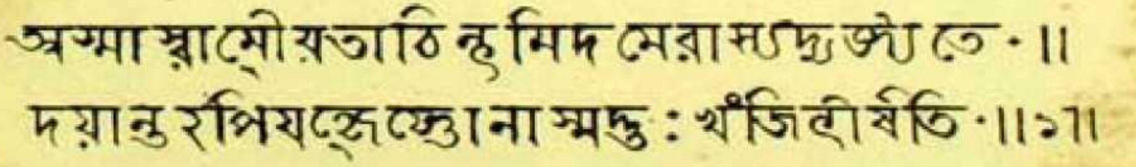
A Sanskrit Śloka written in the three characters of Mithilá.



अस्मास्वात्मीयतात्विद्ध मिद मेवास्म दृश्यते ।।
दयालुरपि यत्क्लेशो नास्म दुःखं जिहीर्षति ॥२॥



The Kayathi character is not adapted for writing Sanskrit. It has no form for short medial i and has no semivowel ya.



ERRATA.

In spite of great care, the following errors of the press, which are owing to the difficulty experienced by the printer in printing an entirely foreign language, have been detected. The necessary corrections should be made, as some are important. They are printed on one side only of the paper so that each correction can be cut out and pasted in the proper place in the body of the work.

	FOR	READ.
P. 5 L. 2 from bottom	Bengálí	Bangálí.
,, 7 ,, 3 from top	ई	ईं
,, 16 ,, 3 from bottom	छा	छौ
,, ,, Foot Note	Usualy	Usually
,, 20 The last three lines should be		
S. चिरंजीविन् *chirañjívin*	long-lived.	चिरंजीविनी *chirañjíbiní.*
M. चिरंजीवी *chiranjíbí*		चिरंजीविनि *chirañjíbin'.*
or चिरंजिब *chirañjib*		or चिरंजीवि *chirañjíb'.*
P. 21 L. 2 from bottom	*máná*	*mányá*
,, 22 ,, 2 from top	*(suddh)*	*(s'uddh)*
,, 23 ,, 5 ,,	which is	which is not
,, 24 ,, 19 ,,	तोँइ	तोँह
,, ,, ,, 23 ,,	पुरूष	पुरुष
,, 27 Foot Note	तांह	तोँह
,, 32 1	लीकनि	लोकनि
,, 36 4 from bottom	*janika*	*janiká*
,, 43 11 from top	*saah*	*sabh*
,, ,, 6 from bottom	***kí*** ? what,	***kí***, what ?
,, ,, Last line	and की ***kí***, what?	की ***kí***, what ? and केओ ***keo***, any one, some one.

P. 44 L. 5 from top *omit* केओ *keo*, any one, some one, becomes कोनो *kono*.

,, ,, ,, 9 *after* "कोन *kon*" *insert* "and केओ *keo*, any one, some one, under similar circumstances always becomes कोनो *kono*.

	FOR	READ.
,, 45 ,, 5 from top	*lotá*	*loṭá*
,, ,, ,, 16 ,,	*amot*	*amoṭ*
,, 46 ,, 2 from bottom	Likenses	Likeness.
,, ,, ,, ,,	like what	like what?
,, ,, ,, ,,	like the same	like that.
,, ,, Last line	how much	how much ?
Numerals. pp. 47—49.		
	२० वीस	२० बीस
	२४ चैावीस	२४ चौबीस
	२६ छव्वीस	२६ छब्बीस
	६४ चैाँसठि	६४ चौँसठि
	६५ पैाँसट्ठि	६५ पैँसट्ठि
	९५ पँचानवे	पंचानबे
	९८ अँठानवे	अंठानबे
P. 50 L. 15 & 16 from top	section	chapter
,, ,, ,, 6 from bottom	it has	the verb has
,, 52 ,, 11 from top	घव	घव
,, ,, ,, 12 ,,	ऐत *ait*	० ऐत *-ait*
,, ,, ,, 14 ,,	० अल *al*	० अल *-al*
,, 53 ,, 9 ,,	CHAPTER VIII.	*omit.*
,, 54 ,, 4 ,,	*chah*	*chhah*
,, ,, ,, 6 from bottom	ओ	ओ
,, 55 ,, 3 from top	कैन्हहि	कैन्हि
,, ,, ,, 8 from bottom	थिकैं *thikaiñ*	थिकैँ *thikāi*
,, 62 ,, 2 & 1 from bottom	देखांहिं *dekhāh'ñ*	देखहिं *dekhah'ñ* or देखांहिं *dekhāh'ñ*

JOURNAL

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ASIATIC SOCIETY OF BENGAL.

◆

Part II.—PHYSICAL SCIENCE.

No. I.—1880.

I.—*On a Simple Method of using an insignificant Fraction of the Main Current produced by a Dynamo-Electric Machine for Telegraph Purposes.*—*By* LOUIS SCHWENDLER, M. INST. C. E. &c.

(Received 29th October; read November 5th, 1879.)

The currents which a dynamo-electric machine is able to generate through a small external resistance, are so enormously strong and also so constant and exceedingly cheap, that I have always thought it would be of technical as well as of economical importance to use them for signalling purposes. The difficulty only was how to solve the problem practically. Manifestly, the currents could not be produced through the telegraph lines, in the ordinary manner of applying dynamo-electric machines, for, in the first place, telegraph lines offer high resistance, and, in the second place, the use of *the closed-circuit system* would become imperative. However, some time ago a very simple method occurred to me which appears to contain the germs of practical success, and, having lately made some experiments on the subject, I do not hesitate to communicate the result.

Suppose we have a dynamo-electric machine, the two terminals of which are connected by a resistance r through which any kind of *useful work* is to be performed by the current.

For instance, during the night, r may consist of an electric arc, and the useful work done by the current is given out as *light* for the *signalling office*; or during the day-time r may consist of another dynamo-electric machine which acts as an ordinary electromagnetic engine, performing some useful mechanical work, *i. e.*, pulling the punkhas, lifting messages, producing a draught of cool air, &c.; or the current may be made to pass through a galvanoplastic apparatus in connection perhaps with the Surveyor General's Office, &c.

Now connecting the *negative pole** of such a dynamo-electric machine to earth, the positive pole to *all* the lines terminating in a telegraph office, while the two poles are permanently connected by the resistance r through which the current produces the useful work above-mentioned, then it will be clear, without demonstration, that *all* the lines so connected can be provided with signalling currents (which are exceedingly weak as compared with the strong main current) by simply *tapping* the main current, and that without perceptibly reducing it, *i. e.*, without affecting the *useful work* performed by the main current through r. Supposing that the useful work performed by the main current repays all the expenses connected with the erection and working of the dynamo-electric machine, then obviously this would be a method which would supply the signalling currents for nothing. This might be an inducement for telegraph-administrations to introduce the electric light, since they would get the signalling currents into the bargain, and the costly and cumbersome galvanic apparatus might be dispensed with.

An example will show this more clearly. A Siemens dynamo-electric machine of medium size can easily be made to produce through an electric arc a current of 30,000 milli-oerstedts, of which not more than 3 milli-oerstedts are required to work the Siemens's polarized relay with engineering safety. Suppose that the sent current is made equal to twice the current which is required to arrive, we have the following calculation for Calcutta office :—14 long lines terminate at Calcutta, hence 14 × 6 = 84 milli-oerstedts would (as a maximum) have to be tapped off from the main current of 30,000 milli-oerstedts. This represents a loss of only $0{\cdot}28\,^{\circ}/_{\circ}$,—which is so small that not even the most sensitive eye would be able to detect any variation in the light.

Hence in this case we would feed the Telegraph lines with currents which actually cost nothing, as the electric light alone would repay all expenses.

During my recent light experiments in London, it was experimentally established that the current in milli-oerstedts which a dynamo-electric machine is able to produce, can be expressed as follows :—

$$C = E \left\{ \frac{1 - e^{-K\left(\frac{r}{r+m}\right)^2}}{r+m} \right\} \times 1000$$

---

* In India we use positive signalling currents.

E and K are two *constants* for any dynamo-electric machine. E is an electromotive force in volts; K is of such dimensions that $v\sqrt{K}$ represents an electrical resistance; m is the internal resistance of the dynamo-electric machine; r is the external resistance through which the useful work by the main current has to be performed.

m and r are to be expressed in ohms. The resistance of the leading wires has been supposed *nil*.

If we call R the resistance of a telegraph line, which we wish to feed from the main current, then the signalling current passing into that line when the main current is tapped would be

$$\frac{C\,r}{R + r} = E\left\{\frac{1 - e^{-K\left(\frac{v}{r + m}\right)^2}}{r + m}\right\} \times \frac{1000\,r}{R + r}$$

and this current, in the case of the Indian lines, should not be less than 6 milli-oerstedts. Hence we have the following equation :—

$$E\left\{\frac{1 - e^{-K\left(\frac{v}{r + m}\right)^2}}{r + m}\right\} \times \frac{1000\,r}{R + r} = 6$$

from which r can be calculated, since E, K, m, v and R are known.

I need scarcely point out, that as R is invariably so large that r can be neglected in comparison with it; the current in *one* line only depends on the resistance of that line, and not on the resistance of the other lines in connection with the dynamo-electric machine. Hence the signalling through one line is not influenced by the signalling on other lines; and in this respect the method is on a par with signalling through different lines by separate batteries.

We will take a special case.—For a Siemens's medium machine, making $r = 3$, we have a main current of about 17,710 milli-oerstedts, and the current passing into a line of 8000 resistance (800 miles of 5½ wire) would be 6·6 milli-oerstedts. Supposing that all the 14 lines at Calcutta office are to be supplied with 6·6 milli-oerstedts each, the current carried off would be 6·6 × 14 = 92·4 milli-oerstedts, or 0·5 % of the main current.

It is best to make all the lines equal in resistance by adding to the shorter lines some artificial resistance. This measure would prevent a dead earth (occurring on one of the lines and close to Calcutta) from having any effect on the working of the other lines. In Europe, where the lines are much shorter, the signalling currents supplied by a given dynamo-electric machine, working through a given resistance r, could be much greater than 6·6 milli-oerstedts.

For any given R (resistance of the line) the currents can be increased by selecting a dynamo-electric machine with the right internal resistance.

The advantages of the method appeared to me sufficiently great to justify a practical trial :—

Experiment, October 11, 1879. With a Siemens's dynamo-electric machine (medium size) I produced a powerful electric light ; and between the poles of the dynamo-electric machine I connected up four artificial lines, each of 10,000 units resistance, with relays ranging between 500 to 1000 units. These four parallel circuits worked very well, singly and simultaneously. No variation of the electric light during telegraphing could be noticed, even when the line resistance was reduced to 1000 units. Further, the resistance of one line was increased to 20,000, and the signalling currents were still sufficiently strong (1·6 milli-oerstedts).

Experiment, October 14, 1879. Same as above ; but a branch current was conveyed by the store-yard line (from the store-yard where the dynamo-electric machine with its electric light was put up) to Calcutta signalling-office (4 miles), and one of the Agra lines (850 miles in length) worked by this current.

The sent current, measured at Calcutta, was 9·6 milli-oerstedts ; the received current, measured at Agra, 1·85. The great loss was due to the exceedingly low insulation of the line near Calcutta. It is now the breaking up of the monsoons, when the climate in lower Bengal represents almost a hot vapour bath.

Several messages were sent to Agra, but no variation in the electric light could be observed.

II.—*On the Occurrence of the Musk-Deer in Tibet.*

By R. LYDEKKER, B. A.

(Received November 17th, 1879.)

Some degree of doubt seems, hitherto, to have prevailed among naturalists whether the Musk-Deer *(Moschus)* occurs on the Tibetan plateau, or whether it is confined to the wooded districts of the Alpine Himalaya. Thus in a paper contributed by Mr. W. T. Blanford to the 'Proceedings of the Zoological Society of London,'* the author says that he has grave doubts whether the Musk-Deer occurs anywhere on the Tibetan plateau. In a paper published by myself in the Society's Journal,† I mentioned that, from having seen skins in Ladák, as well as from the fact of the Ladákis having a name for the animal, I was of opinion that the Musk-Deer must occur somewhere in Tibet, though I had at that time no positive proofs to offer. Lately, however, I have obtained such evidence as seems to leave no doubt that this animal should be reckoned among the fauna of Tibet.

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* 1867, p. 634. † 1877, Pt. II, pp. 287-8.

Firstly, it will, I think, be generally admitted that the musk-pods of the Musk-Deer are an important article of export from Tibet to India.* Although this affords *primâ facie* evidence that the Musk-Deer occurs in Tibet, yet it might be objected that this musk was first taken from China to Tibet, and thence exported through Nepál or Ladák to India; I, therefore, now proceed to bring forward the more direct proofs of the occurrence of the animal in Tibet proper.

The earliest evidence which I have to notice, is that of the great traveller Marco Polo.† That writer mentions the occurrence of the Musk-Deer at a place which he calls Ergiul, which Colonel Yule locates to the north of Tibet, and south of the great Gobi desert, in latitude 40°. From Marco Polo's description, there can be no doubt of the identity of the animal referred to with the Musk-Deer, though he commits the error of mentioning a pair of lower as well as upper tusks. Again, the same traveller‡ mentions the occurrence of the same animal in eastern Tibet, probably somewhere near the longitude of Lhása, and also that the Tibetans call the animal Gureri.

A later traveller, Mr. Bogle, the envoy of Warren Hastings, describes§ most circumstantially the hunting and capture of a Musk-Deer (or, as he calls it, Musk-Goat) at Rinjaitzay, which is situated north of the Tsánpú river near Shigátze in Tibet. Mr. Bogle describes the animal as being hornless, coated with stiff hair, and with tusks depending from the upper jaw of the male: he also mentions that the Tibetan Musk-Deer is of a lighter colour than the Musk-Deer of Bhútán. This description leaves no possible doubt as to the animal referred to.

General Cunningham‖ mentions that the Musk-Deer (known to the Ladákis as Lá) is found in Tibet as well as in Kashmir.

During the past summer, I met in Lahúl with a Tibetan who had formerly occupied a high official position at Lhása, and who informed me, that the Musk-Deer was of common occurrence on the Tsánpú river in the neighbourhood of Lhása.

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* Markham, 'Tibet.' Int. p. cxxii, p. 197.
Hodgson 'Trade of Nepál.'
Cunningham. 'Ladák,' p. 242.

† Yule's 'Marco Polo,' Vol. I, p. 267.

‡ Yule, loc. cit., Vol. II, p. 37.

§ Markham, loc. cit., p. 114.

‖ Loc. cit., p. 202.

Mr. W. H. Johnson, the Governor of Ladák, informs me that the Musk-Deer is found in the country below and to the east of Lhása, along the course of the Tsánpú river. The musk brought from this district, Mr. Johnson says, has wrongly acquired the name of Khoten musk; this seems to have originated from the fact that when Khoten was a large Buddhist city, and important trading place, the musk was carried there from Lhása, and thence to India. Mr. Johnson also observes that the Musk-Deer occurs only where the birch tree grows.

The whole of this evidence taken together appears to me to afford abundant evidence as to the occurrence of a species of *Moschus* in Tibet, though I have no means of knowing whether it be the same as *M. moschiferus.* The Musk-Deer is of common occurrence in Bhútán, and it appears to me to be probable that it extends north of that district in most of the open countries up to Tibet, and thence across, or round, the Gobi desert into Siberia.

The occurrence of the Musk-Deer far in on the Tibet plateau is a fact of considerable importance, as it is the only instance of any of the large mammals of the forest clad Alpine Himalaya extending its range into the dry and desert regions to the north.

In my former paper, quoted above, I thought it probable that the Musk-Deer occurred in Ladák; this, however, I now find is not the case; I can find no evidence of the animal occurring anywhere in the upper Indus valley.

III.—*Note on some Ladák Mammals.—By* R. Lydekker, B. A.

Otter.—In his report on the Mammalia of the second Yarkand Mission* (p. 32), Mr. W. T. Blanford mentions that the late Dr. Stoliczka, in his notes, referred to the occurrence of a small species of otter *(Lutra)* in the Indus at Leh, but was unable to procure a specimen.

During the past summer I purchased at Leh a flat skin of an otter, said to have been obtained from the Indus at Shushot, near Leh. This skin is of very dark colour superiorly, and the length of the body-part is about 30 inches; the tips of the hairs are paler. Unfortunately, neither the skull nor the claws remain in my specimen, so that specific determination is quite impossible. The skin, however, seems to be very like that of the European

* 'Scientific Results of the Second Yarkand Expedition,' Mammalia, by W. T. Blanford. Calcutta, 1879.

otter (*L. vulgaris*), and the animal, therefore, may very possibly belong to the same species as a skin obtained by Major Biddulph in Gilgit (? from the Indus), and which Mr. Blanford, in the above-quoted note, thinks is very like *L. vulgaris.*

I learn from Mr. Elias, the British Joint-Commissioner at Leh, that otters are said to be of common occurrence at the bridge which spans the Indus below Leh; these otters live in the stone-work piers of the bridge. I may add that Mr. Elias has promised to endeavour to procure a specimen of the skin and skull of one of these animals.

Dr. Stoliczka speaks of the Leh otter as being a small species; since, however, he never procured a specimen, and as my specimen is a large skin, it is probable that Stoliczka's estimate of size was not exact.

Marmots.—I cannot quite agree with Mr. Blanford* in calling the Red Marmot (*Arctomys caudatus*) the common marmot of Ladák, as it appears to me that the species is only found on the outskirts of that region. I have procured specimens of that species on the range between Kashmir and Tilel (Kishenganga valley), on the pass between Tilel and Drás, and on both sides of the Zoji-Lá, separating the latter place from Kashmir. I have, however, never seen this species in the more interior parts of Ladák, where it appears to me to be replaced by *Arctomys himalayanus*, or the Yellow Marmot, which appears to me to be entitled to be called the "Ladák Marmot" *par excellence.* I have seen or procured specimens of the latter species, from the mountains above Khalchi, on the Indus; on the pass separating the Markha river from the Gia river, to the south of Leh; and, still further south, on Kiang-Chu Maidân, in Rúpsú; to the north of the Indus in Ladák, on the Chang and Kai passes, forming the watershed of the Indus and Shyok rivers; around the Pangong lake; and in the Chang-Chenmo valley. *Arctomys caudatus* seems to me to be confined to the country on the confines of the rainless districts, while *A. himalayanus* occurs only in the inner, and thoroughly Tibetan, districts.

In the field, the two species can be at once distinguished by their respective cries. The cry of the Red Marmot is a peculiar long screaming whistle of great shrillness: the Yellow Marmot on the other hand utters a short chirping bark. It is not easy to convey an idea of the two sounds to the reader, but when they have been once heard in the field, they never can be mistaken for one another.

I should be much inclined to doubt the suggestion of Mr. Blanford† that the marmot said by Dr. Stoliczka to range up to a height of 17,000 feet in Ladák is *A. caudatus;* it is much more likely to be *A. himalayanus*, which I have killed above 18,000 feet; the former I have never seen above 14,000 feet (Drás and Tilel pass).

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* Loc. cit. p. 37.

† Loc. cit. p. 39.

IV.—*A Sketch of the History of the Fossil Vertebrata of India.*—

By R. LYDEKKER, B. A.

(Received January 6th; read February 4th, 1880.)

As far as I am aware, there has not hitherto been written a complete history of the whole Fossil Vertebrate Fauna of India, as far as it is at present known to us, and I have, therefore, thought that it may interest many members of this Society, as well as others, to know something of the extent and affinities of this fauna, without the labour of wading through the various works in which its history is recorded. The history of the Fossil Vertebrata of India is, indeed, intimately connected with this ancient Society, since some of the earliest workers in this branch of enquiry were formerly among its members, and many of the results of their labours are to be found scattered through its earlier records. Pre-eminent among those workers will always stand out the names of Baker, Durand, Cautley, Colvin, Falconer, Hislop, M'Clelland, and Spilsbury. And it must always be remembered, to their honour, that these workers in this most interesting department of palæontology were solely amateurs, and that in their time the study of vertebrate palæontology in this country was encumbered with difficulties of which we, at the present day, can have no adequate conception. The labours of Mr. Hislop were mainly expended in searching the Gondwána rocks of the Central Provinces, from which he obtained many interesting remains of reptiles, batrachians, and fishes; Col. Sykes' collections were chiefly made among the fossil fishes of the Deccan; while the field of labour of the other workers lay mostly among the mammaliferous beds of Northern India, and the Narbada (Nerbudda) valley.

I very much regret to say that since these illustrious workers, no amateurs in India seem to have entered upon this interesting field of research, and during the five years which I have been upon the staff of the Geological Survey of India, we have not, I believe, received, in the Indian Museum, a single fragment of a fossil vertebrate from a non-professional worker. It is partly in the hope that this paper may reach the eye of amateurs interested in natural science, and especially of those who lead a wandering life in India, and induce them to endeavour to collect specimens of vertebrate fossils for the Indian Museum, that it has been penned.

Apart from members of the Geological Survey of India, to whom I shall refer presently, there are other workers who, though not members of this Society, have contributed largely to the history of the extinct vertebrate life of India. Noticeable among these are the names of Buckland, Crawfurd, and Clift. Crawfurd, on his return from his mission to the court of Ava in 1826, brought back some Tertiary mammalian remains from the valley of the Irawadi, which were among the first obtained in Asia by Europeans, and which were subsequently described by the late Mr. Clift in the 'Transactions of the Geological Society of London.'* In the same volume of the 'Transactions,' a memoir was also published by the late Dr. Buckland on the Ava bones. Another memoir also appeared in the same volume by Mr. Pentland, on certain mammalian remains from the Siwaliks of Sylhet, collected by Sir T. Colebrooke. As you are doubtless aware, the fossil vertebrate fauna of the Siwaliks and the newer Narbadas, were subsequently fully illustrated, and in part described, by our former illustrious associates, Falconer and Cautley, the results of whose labours are abundantly dispersed through our Society's publications, and displayed in that now classic work the 'Fauna Antiqua Sivalensis.'

Dr. Charles Murchison, the editor of the 'Palæontological Memoirs' of Dr. Falconer, has rendered one of the most important services to the cause of vertebrate palæontology in this country, by collecting and publishing the scattered notes and memoirs of that distinguished palæontologist. Professors Owen and Huxley have contributed largely to our knowledge of the fossil Reptilia and Batrachia of India; while the fossil fish have been enriched either by the discoveries or the writings of Messrs. Egerton, Miall, Sykes, and Walker.

A valuable memoir on the extinct Siwalik genus *Sivatherium* was contributed to the 'Geological Magazine' by Dr. Murie; another on *Bramatherium*, by Mr. Bettington and Professor Owen, to the 'Journal of the Royal Asiatic Society.' A few Siwalik fossils collected by the Messrs. Schlagintweit were described in the German 'Palæontographica' by the late H. von Meyer. The late Dr. J. E. Gray also determined a few of the Indian fossil reptiles. Professor A. Milne-Edwards determined some Siwalik bird-bones. Some mammal-bones from the Tibet Tertiaries were determined by Mr. Waterhouse.

Among the later contributors to our knowledge of the fossil vertebrata of India must be mentioned Professor Rütimeyer, who has afforded valuable information on the Siwalik ruminants in the British Museum; and Mr. P. N. Bose, who has described some of the fossil Siwalik Carnivora in the same collection. Mr. Davies, of the British Museum, has also contributed to the 'Geological Magazine' a valuable paper on Siwalik birds. Professor Leith Adams has published some notes on *Elephas namadicus* in the Palæontographical Society's publications.

The above names are only the chief among the workers in Indian vertebrate palæontology who are unconnected with the Geological Survey of India. Of the former or present officers of that department, I must mention, among discoverers, the names of Messrs. W. T. and H. F. Blanford, Fedden, Foote, Hacket, Hughes, Medlicott, Theobald, Tween, and Wynne, and, among writers, Messrs. W. T. and H. F. Blanford, Foote, Oldham, Stoliczka, Theobald, Waagen, and, lastly, myself.

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* Ser. 2, Vol. II.

Minor contributions, in the way both of specimens and papers, have been made by other gentlemen, all of whose names it would be both tedious and difficult to bring together, but for whose exertions the workers in this branch of enquiry have, none the less, good cause to be grateful. Among these names I may mention, Bell, Dr. (Ichthyolite from Kach); Blyth, E. (Siwalik Mammals); Burney, Col. (Ava Vertebrates); Burt, Lieut. (Jamna Bones); Cantor, T. (Siwalik fish-skull); Carter, Dr.; Colebrooke, Sir T. (Tibet Tertiary Mammals); Dawe, W. (Tertiary Vertebrates); Dean, E. (Jamna Mammals); Everest, Rev. R. (Siwalik Vertebrates); Felix, Major, (Narbada Mammals); Foley, Capt. (*Diodon* from Ramri Island); Frazer, Capt. (Narbada Mammals); Fulljames, Capt. (Perim Mammals); Godwin-Austen, Col. (Siwalik Mammals); Gowan, Major (*Archegosaurus* from Bijori); Hügel, Baron (Perim Fossils); Ewer, W. (Siwalik Vertebrates); Lush, Dr. (Perim Vertebrates); Ousely, Col. (Narbada Mammals); Pepper, Miss (Perim Mammals); Phayre, Sir A. (Ava Mammals); Prinsep, J. (Tertiary Mammals); Rivett-Carnac, H. (*Archegosaurus* from Bijori); Royle, (Siwalik Mammals); Sim, Lieut. (*Archegosaurus* from Bijori); Smith, Capt. E. (Jamna Mammals); Strachey, Genl. (Tibet Tertiary Mammals); Trail, Dr. (Tibet Tertiary Mammals); and Verchere, Dr. (Siwalik Mammals).

The extinct vertebrate fauna of India, with the noticeable exception of the mammalian upper Tertiary fauna, is generally remarkable for its extreme poverty; a poverty which may be due in some cases to the want of adequate research, and in others to the small number of fossils preserved in the different strata. Only here and there, in the great Gondwána series of India—which, as far as regards its higher and fossiliferous part, in serial position, in mineralogical composition, and in its fresh-water character, seems to correspond very closely with the Trias-Jura of the Connecticut valley in America,—do we find fossils locally abundant, as the reptiles of the Panchet group, and the fish and reptiles of the Kota-Maleri and neighbouring groups. With the exception of a few Cretaceous reptiles, the fossils from the above-mentioned groups, which are really very few, are the only representatives of the Pre-Tertiary land and fresh-water vertebrate fauna of which we have any traces in India.

In place of the numerous and gigantic dinosaurs of the secondary lands of Europe and America, we have in India only here and there a few bones, indicating the former existence of a small number of species; while of the more specialized and bird-like dinosaurs of those countries, we have as yet no trace in India; neither of the toothed birds, which present so remarkable a feature in the secondary epoch of America, are there any vestiges in India. The numerous species of the volant and toothed pterodactyls of Europe, and of their toothless representatives in America, are also totally unknown from Indian strata.

Of the gigantic estuarine or marine saurians, so characteristic of the secondaries of Europe and America, Indian strata have hitherto only yielded a few remains of a single *Ichthyosaurus* and *Plesiosaurus*. Of the lower batrachians, only a few species are known from the (probably) Triassic rocks of India, and the great number of species so characteristic of the Carboniferous and Trias of Europe are almost totally unrepresented in this country. The marine fish fauna is likewise remarkable for its general poverty.*

It must, however, be observed that many of the vertebrates which do occur are only known by a single skull, or a tooth, or a few bones or scutes, and it, therefore, seems probable that many other species must have left similarly scattered remains through the strata of India, which from their extremely local distribution have hitherto escaped detection.

No distinctly recognizable traces of mammals have been as yet detected in India below the Nummulitic rocks, and in the latter only by a few generically undeterminable bones; indeed, we meet with no well-developed mammalian fauna till the period of the Upper Miocene and Lower Pliocene, when we suddenly come upon the evidence of the former existence of a vast and varied fauna which is, probably as numerically abundant in its species and genera as any known fossil fauna in the world. Previous to the Tertiary, the whole history of mammalian life in India is a complete blank. The bird-fauna of India, with a few exceptions, is almost totally unknown previously to the present epoch.

The above remarks have an important negative bearing on evolution. We know that the greater part of the peninsula of India has existed as land for an incalculable period of geological time,—at all events from the Triassic epoch, and we further know that in other regions mammals have existed on the globe since the Triassic, and birds since the Jurassic, period. As regards the above two groups of vertebrates, India throws not a single ray of light on their origin. We have not a trace of any one of the curious generalized forms of the Eocene mammals of North America in the strata of India, and yet we cannot think that ancient India was almost without mammalian life till the upper Miocene. It is indeed probable that the lost mammals of Secondary and early Tertiary India may have filled many a puzzling gap in the animal series.

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* Marine rocks are absent over most parts of peninsular India, though present in force in Trichinopoli, Kach, Sind, and the Himalaya.

It is the same with the reptiles, which were doubtless the dominant forms during the epoch of the Trias-Jura, and which have only here and there left a trace of their former existence in this country. Why may not many forms of those half-birds, half-reptiles have inhabited Secondary India of whose existence we have ample proofs in other countries; and why may not many of such Indian forms have still more closely bridged the gap which even yet exists between birds and reptiles? Great and numerous as are the advancements in uniting the scattered links of the broken chain of vertebrate evolution, it must ever be borne in mind that, while we have evidence of a large Secondary land-surface like India, which has hitherto yielded scarcely any links to this wondrous chain, we must never despair if we find that other countries are still of themselves unable to make the chain extend across all the gaps, owing to the want of a few links. Who shall say that such missing links never inhabited Secondary India, where their remains either still lie buried, or have been for ever lost beyond recovery? I, indeed, imagine that early India must have teemed with reptiles, and perhaps with higher forms of life, for it is inconceivable that this country was once mainly a mere forest of plants, of the existence of which we have such ample evidence in the Trias-Jura, unenlivened, except in one or two small spots, by vertebrate life.

I now proceed to sketch what is known of the fossil vertebrates of India, commencing with the lowest class, and tracing it through the various formations from the lowest in which it occurs to the highest; and similarly with the higher classes. I must premise that very many of the Indian fossil vertebrates are only known by extremely scanty remains, and that their affinities are consequently obscure. Of others, again, only very slight preliminary descriptions, without figures, have yet been published, and consequently foreign palæontologists have not yet had the opportunity of comparing them with other species, by which their affinities might be more fully illustrated.

FOSSIL FISHES.

Carboniferous.—The earliest fishes of which we have at present any record in India are only known by some few teeth and fin-spines, collected by Dr. Waagen and Mr. Wynne of the Geological Survey, in the Salt-Range of the Punjáb, and described by the former writer in the 'Palæontologia Indica.'* These fish remains were obtained from strata termed by Dr. Waagen the "Productus-Limestone," corresponding in the main to the Carboniferous. *Sigmodus dubius* is a fish belonging to a new genus founded upon a single tooth; this tooth is of an elongated conical form, and much resembles the teeth of some saurians; it is referred by Dr. Waagen to the ganoids. Another tooth, referred provisionally by Dr. Waagen to the genus *Poecilodus*, under the name of *P. paradoxus*, is of the flattened cestraciont type. *Psephodus indicus* is a species formed upon the evidence of another tooth. Both these genera belong to the *Cochliodontidæ*, which Dr. Waagen classes among the Dipnoi, though they are more generally referred to the Elasmobranchii. Of the undoubted Elasmobranchii (Selachii), Dr. Waagen describes four species, belonging to three genera, from teeth, and four species, belonging to two genera, from fin-spines (ichthyodorulites). Of the teeth, two are referred to a genus (*Helodopsis*) allied to *Helodus*, under the names of *H. elongata* and *H. abbreviata.* A fragment of a tooth is referred, without specific determination, to the European genus *Psammodus*, characteristic of the Carboniferous. A fourth tooth is referred to the European genus *Petalorhyncus*, with the specific name of *P. indicus*: it is extremely doubtful whether *Petalorhynchus* is really distinct from *Petalodus* of the Carboniferous. Of the spines, or "ichthyodorulites," three specimens are referred to the American Carboniferous genus *Xystracanthus*, under the names of *X. gracilis* and *X. major* and *X. giganteus*. If I rightly understand Dr. Waagen's notes, he thinks it possible that these spines may belong to *Helodopsis*. A third spine is referred to a new genus under the name of *Thaumatacanthus blanfordi.*

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* Ser. XIII, parts 1 and 2, 1879-80; the latter part in the press.

As far as the evidence of these fishes goes, we find that the cestraciont-toothed sharks were the dominant forms in the Indian, as well as in the European and American Carboniferous.

Trias-Jura.—In the upper part of the great Gondwána system of India, which, as I have said, probably corresponds as a whole to the Trias-Jura of other countries, remains of fishes have been found in some abundance, all of which, as far as determined, are of fresh-water types, and belong to the Ganoidei and Dipnoi, no traces of the more modern Teleostei having yet been found in these rocks. The earliest groups of rocks in the Gondwána system in which fish remains have been detected are the Mangli and Srípermatúr groups; but these remains have not yet been even generically identified. In the Kota-Maleri* group there occur nine species of Ganoids and three of Dipnoi; the former from the Kota beds have been described under the genera *Dapedius*, *Lepidotus*, and *Tetragonolepis* by Messrs. Egerton and Sykes;† many of them show Liassic affinities: the three genera have a united range in Europe from the Lias to the Eocene: *Lepidotus* is very characteristic of the Wealden of England. Of the Maleri Dipnoi, teeth of four species of the living Queensland genus *Ceratodus* were named by the late Dr. Oldham, three of which have lately been figured by Professor Miall,[*] who does not admit the fourth species, *C. oblongus*.

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* Mr. King has lately shown a distinction between the Kota and Maleri beds; confirming the original distinction as to the Liassic affinities of the fossils of the former, and the Rhæto-triassic of those of the latter.

† Quar. Jour. Geol. Soc. of London, Vols. VII, IX, X. Palæontologia Indica, Ser. IV, part 2.

Cretaceous.—A few fish-remains have been obtained from the Lameta rocks (of middle Cretaceous age), but are not yet determined. The next group of rocks in which fish-remains have been obtained are the upper and middle Cretaceous rocks of Trichinopoli; these remains have been described by the late Dr. Stoliczka[†] and Sir Philip Egerton.[‡] They comprehend seventeen species of elasmobranchs, ranged under the genera *Corax*, *Enchodus*, *Lamna*, *Odontaspis*, *Otodus*, *Oxyrhina*, *Ptychodus*, and *Sphærodus*, and one ganoid doubtfully referred to *Pycnodus*. No Teleostei have been described, which is very probably owing to the less facility with which their remains are preserved; it being almost certain that they must have been represented in the Indian Cretaceous seas. The above-named genera are mainly characteristic of the Cretaceous rocks of Europe: two species are common to Europe and India. Bones, apparently of fishes, have been lately obtained by Mr. Griesbach from the Trias of Tibet. Mr. Griesbach tells me that these bones are not uncommon in the Trias limestone, but that he has not yet been able to extract any specimens in a determinable condition.

Eocene.—From the probably Nummulitic rocks of Port Blair, in the Andamans, and Rámri Island, off the Arakan coast, there have been obtained the oral teeth of a large species of *Diodon*, which I have lately provisionally called *Diodon foleyi*, after Captain Foley, the discoverer of the Rámri Island specimen.[§] The living *Diodon hystrix* is now abundant off the coasts of the Andamans and Arakán, where the genus has doubtless lived since the Eocene. From Nummulitic rocks in the neighbourhood of Thyatmyo, cycloid fish-scales have been obtained,[‖] but are not generically determined.

From the Nummulitics of the Punjáb, some fish-scales and the dental plate of a species of ray (*Myliobatis*) have been obtained by Mr. Wynne.[¶] From strata immediately overlying the Nummulitics of Kohát, Mr. Wynne has obtained the incisor of a sparoid fish belonging to the genus *Capitodus*, which has been recently described by myself as *C. indicus*;[**] the genus

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[*] Palæontologia Indica, Ser. IV, part 2.

[†] Ibid., Cretaceous Fauna of S. India, Vol. IV.

[‡] Quar. Jour. Geol. Soc. Lon. Vol. VII.

[§] R. G. S. I. Vol. XIII, part I.

[‖] Manual of Geology of India, p. 716.

[¶] R. G. S. I. Vol. X, p. 43.

[**] Ibid. Vol, XIII, part I.

Capitodus was previously only known from the Miocene of Vienna and Silesia, and is allied to the living genus *Sargus*.

Mio-Pliocene.—From the Siwalik rocks there were, I believe, a considerable number of fish-remains procured by Falconer and Cautley, but these were never described: the collection of fossil fish-remains from the Siwaliks in the Indian Museum is but small. Among the Teleostei, we have the siluroids represented by a very perfect skull, originally described in the Society's Journal* by Dr. Cantor as the skull of a huge frog: subsequently this skull was referred by M'Clelland† to the siluroid fishes. The latter writer describes the skull as being remarkable for its great breadth, and as carrying teeth on the jaws, but not on the palate: M'Clelland also thought that the skull might belong to a species of *Pimelodus*: this determination is, I think, certainly erroneous, because the latter genus, with one African exception, is entirely West Indian, and it is unlikely that a fresh-water genus of fishes should be found in the Pliocene of India, and now only in Africa and the West Indies. Many of the living Indian siluroids (*Clarius*, *Heterobranchus*, *Silurus*, *Silurichthys*) have palatal teeth, and the fossil cannot, therefore, belong to any of those genera. The Indian genus *Chaca*, on the other hand, is characterized, according to Dr. Günther,‡ by its exceedingly broad and depressed head, and absence of palatal teeth, and I think, therefore, it is not improbable that the fossil may belong to that genus, though, in the absence of specimens for comparison, I cannot be sure. Detached vertebræ, from the Siwaliks, also indicate the existence of teleostean and, probably, fresh water fishes, but of what group is uncertain. Of the Elasmobranchii, a few teeth indicate the former existence of a Siwalik *Lamna*, which probably inhabited the larger rivers: a single tooth from the mammaliferous beds of the Irawadi belongs to a species of *Carcharias*, and large squaline vertebræ have been obtained from Perim Island. From the Siwaliks of Sind and the Punjáb, we have some crushing palatal teeth of an undescribed fish, which I have lately sent home for determination.

Scales of teleostean fishes have been obtained by Col. Godwin-Austen from the Tertiaries or post-Tertiaries of Kashmir; they are not, however, determined.

The above notes indicate the extreme poverty of the fossil fish-fauna of India—a poverty, I think, in great part due to the want of sufficient search.

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[*] Vol. VI, p. 583.

[†] Calc. Jour. Nat. Hist. Vol. IV, p. 83.

[‡] Brit. Mus. Cat. of Fishes, Vol. V, p. 29.

FOSSIL BATRACHIANS.

Trias-Jura.—We now come to the history of the fossil Batrachia (Amphibia), where we shall find an equal poverty of species and genera; such as are known being merely, in all probability, a few relics left from a large fauna. The oldest Indian batrachians, like their European and American contemporaries, belong to the labyrinthodont order, characterized by the peculiarly infolded structure of their teeth. The oldest form of the order in India is only known from an undescribed skeleton obtained from a group of the Gondwána system at Bijori, hence named by Mr. Medlicott the Bijori group.* This skull was originally exhibited before our Society in 1864, and commented upon by Mr. H. F. Blanford, who thought that it should be referred either to *Archegosaurus* or *Labyrinthodon*,† adducing some evidence to shew that it belonged to the former genus. Subsequently, the specimen was alluded to as a true *Archegosaurus* by the late Dr. Oldham,‡ and still later by Mr. Medlicott.§ I cannot discover what has become of this most interesting fossil, which is certainly not in the collection of the Indian Museum, where it is only represented by a cast. Judging from this cast, I think it not improbable that the specimen really does belong to *Archegosaurus*: it much resembles a skull of that genus from the European Carboniferous figured by H. von Meyer.‖ The European species being from the Carboniferous rocks does not at all preclude the Indian species from being of Triassic age, since there is considerable difference in the range in time of the Pre-Tertiary land faunas and floras of the two countries; genera having very frequently survived to a later period in India than in Europe.

From the Panchet group of the Gondwánas, we have two labyrinthodonts, to which the generic names *Pachygonia* and *Gonioglyptus* have been applied by Professor Huxley;¶ these genera are only known by fragmentary skulls and jaws; they were slender-jawed forms and allied to the labyrinthodonts of the Keuper. They are classed by Professor Miall in the group Euglypta with *Mastodonsaurus* and *Capitosaurus*. The fossils on which the two above-named Indian genera were founded are in the collection of the Indian Museum. From the nearly contemporaneous Mangli group, we have another labyrinthodont, *Brachyops laticeps* of Owen, also belonging to a genus otherwise unknown, and allied to European Jurassic, and African and Australian (probably) Triassic forms. The skull on which the genus is founded was described by Professor Owen.* The European Jurassic genus to which it is allied is *Rhinosaurus*, the African (Triassic ?), *Micropholis*, and the Australian, *Bothriceps;* the genus seems to me to be also closely allied to *Tuditanus radiatus* of the American Carboniferous. *Brachyops* belongs to the short-jawed group of labyrinthodonts; and, with the first three above-mentioned genera, constitutes the group "Brachyopina" of Professor Miall. The skull of *Brachyops* is, I believe, in the collection of the Geological Society of London: it is represented by a plaster cast in the Indian Museum.

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* M. G. S. I. Vol. X, p. 159, (art. II, 27.)

† J. A. S. B., Vol. XXXIII, p. 337.

‡ R. G. S. I. Vol. IV, p. 70.

§ Loc. cit.

‖ Palæontographica, Vol. VI, pl. XI, fig. 5.

¶ Pal. Ind. Ser. IV. part 1.

Tertiary.—From the Trias to the Tertiary is a long leap, but hitherto no batrachian remains have been found in India between these two formations. In the lower Tertiaries of the island of Bombay, there occur a large number of the remains of frogs belonging, apparently, to two species. The smaller of these two species was first described by Professor Owen† under the name of *Rana pusilla ;* subsequently, however, Dr. Stoliczka,‡ from the absence of vomerine teeth and from the structure of the limbs, referred the species to the genus *Oxyglossus*, at the present time living in China and Siam, and, possibly, in India. A larger frog from the same beds, noticed by Professor Owen in the same paper, has not yet been generically determined. I believe that these Bombay frogs are the oldest representatives of the group.

FOSSIL REPTILES.

Trias-Jura.—The oldest members of the class Reptilia hitherto found in India belong to the orders Dinosauria and Dicynodontia (Anomodontia), and occur in the presumably Triassic rocks of Panchet near Ránigan, in the horizon known as the "Panchet group." The *Dicynodon* was originally described by Professor Huxley§ under the name of *D. orientalis ;* additional remains have subsequently been described by myself,‖ which show that this species belonged to the sub-genus *Ptychognathus* of Professor Owen. Other remains noticed in the latter memoir, seem to indicate the former existence of a second and larger species of *Dicynodon*. This group of reptiles seems, on the whole, to be characteristic of the Trias of India, Russia, and Africa. The dinosaur has been named *Ankistrodon indicus* by Professor Huxley,¶ and is the only known representative of the genus. The teeth of *Ankistrodon*, of which only two are known, have laterally compressed crowns, with serrated edges, like those of the dinosaurian *Megalosaurus* and the mammalian *Machærodus*, and are implanted in distinct sockets. The genus is allied to the Jurassic and Cretaceous *Megalosaurus*, and to various Triassic genera.

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* Q. J. G. S. L. Vol. XI, p. 37.

† Ibid. Vol. V, p. 173.

‡ M. G. S. I. Vol. VI, p. 387.

§ Pal. Ind. Ser. IV, Vol. I, part I.

‖ Ibid. part 3.

¶ Loc. cit.

From the Denwa group of the Gondwána system, a large crocodilian scute has been obtained by Mr. Hughes,* which seems to belong to Professor Huxley's undescribed genus *Parasuchus*.

From the neighbouring Kota-Maleri group, we have the crocodilian *Parasuchus* and the lacertian *Hyperodapedon*. The genus *Parasuchus* has never been described, but only incidentally alluded to by Professor Huxley†; it was formed for the Kota-Maleri bones: it seems to have been closely allied to the Triassic *Belodon* and *Stagonolepis*. On labels attached to the bones of *Parasuchus*, now in the Indian Museum, there occurs the specific name of *hislopii*, in Professor Huxley's handwriting. *Hyperodapedon*‡ is closely allied to the living genus *Hatteria (Sphenodon)*, represented by two species in the New Zealand Islands, and, according to Professor Huxley, to the Triassic *Rhynchosaurus*, though this is doubted by Professor Owen.

From the undoubtedly Jurassic rocks of Kach (Cachh), there has been obtained (Chári group) a vertebra which I think very probably belongs to *Parasuchus*, though I cannot be certain;§ and (Umia group) a fragment of a lower jaw of a *Plesiosaurus*, which I have named *P. indicus*:‖ the specific affinities of the latter cannot be fully determined from the fragment.

Cretaceous.—From the Cretaceous rocks of India, we have, among the Dinosauria, a species of *Megalosaurus*, certainly from the Trichinopoli, and probably from the Lameta rocks (middle Cretaceous);¶ this genus is only known in India by detached teeth; in Europe, it ranges from the Jurassic to the lower Cretaceous (Wealden). From the Lameta rocks, there have also been obtained the remains of another gigantic genus of dinosaur, allied to the Wealden *Pelorosaurus* and the Jurassic *Cetiosaurus*, which I have named, from the great size of the bones, *Titanosaurus*;** from the evidence of the vertebræ, there appear to have been two species, *T. indicus* and *T.*

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* Pal. Ind. Ser. IV. part 3.
† Q. J. G. S. L. Vol. XXVI, p. 49, XXXI, p. 427.
‡ Ibid. XXV, p. 151.
§ R. G. S. I. Vol. X, p. 35.
‖ Pal. Ind. Ser. IV, part 3.
¶ Ibid.
** Ibid.

blanfordi. *Titanosaurus* was a gigantic and, probably, land reptile, but whether bipedal or quadrupedal is not known. Remains of another, but much smaller, reptile have been also obtained by Mr. Hughes from the Lameta rocks; the remains are, however, not sufficient for generic determination, but I think it not impossible that they may have belonged to a dinosaur.

Of the Cretaceous Crocodilia, we only know of one species by some amphicoelian vertebra and scutes obtained by Mr. W. T. Blanford from the upper Cretaceous rocks of Sind[*] As far as I can judge, from these imperfect remains, they appear to indicate an animal allied to *Suchosaurus* of the Wealden of England.

The Chelonia are only known to have existed in India during the Cretaceous period by the evidence of some broken plates, in the collection of the Indian Museum, obtained from the Lameta group, from the intra-Trappeans of Rajamahendri (Rajamundry), and from the upper Cretaceous rocks of Sind. These remains are in far too imperfect condition for even generic determination.

A large species of *Ichthyosaurus*, which I have called *I. indicus*,[†] is known solely by a few vertebræ collected by Mr. Foote in the middle Cretaceous rocks of Trichinopoli. *Ichthyosaurus*, in England, ranges from the Lias to the Chalk.

Eocene.—The only specifically known Eocene Indian reptile with which I am acquainted, has been referred by the late Dr. Gray[‡] to the genus *Hydraspis* belonging to the family Emydidæ. The specimen on which the determination rests is a carapace, from the intra-Trappean rocks of Bombay, originally named by Mr. Carter *Testudo leithii*. The genus *Hydraspis* is now found living exclusively in Tropical America. From the Nummulitics of the Punjáb, remains of Crocodilia have been obtained by Messrs. Theobald and Wynne, of the Geological Survey, but are not generically determined.

Mio-Pliocene and Pleistocene.—From the Mio-Pliocene Siwaliks and from the Pleistocene Narbadas, a considerable number of reptilian remains have been obtained, but, in many cases, have not yet been described. Remains of Crocodilia have been obtained in considerable numbers from the Sub-Himalayan Siwaliks and from the corresponding rocks of Burma, Perim Island, and Sind; and many of them have been named by Falconer. Of the genus *Crocodilus*, a Siwalik species has been identified with the living *C. palustris* (*bombifrons*, Gray).[§] Remains of a crocodilian have also been obtained from the Irawadi and the Narbada, but their specific determination is difficult. Of the genus *Gharialis* (*Leptorhynchus*), one Siwalik species has been identified with the living *G. gangeticus*; a gharial from the Manchhars of Sind also belongs to this species. Another long-jawed Siwalik crocodile with slender teeth has been named *Gharialis leptodus*; and another with much shorter jaws and teeth, *G. crassidens*; the latter has been obtained from the Siwaliks and from Sind.

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[*] Pal. Ind. Ser. IV. part 3.

[†] Ibid.

[‡] Ann. Mag. Nat. Hist. Ser. IV, Vol. VIII, p 339.

[§] Cat. Foss. Vert. A. S. B. p. 200. The cranium there named *C. palæindicus* seems to belong to *C. palustris*.

Of the order Lacertilia, only one Siwalik representative is known, belonging to the genus *Varanus*, and named by Falconer *V. sivalensis*.* This determination was made on the evidence of a distal extremity of the humerus, now in the British Museum.

The Ophidia are only known by some vertebræ, much like those of the genus *Python*, obtained from the Siwaliks of the Punjáb and Sind: these vertebræ have not yet been generically determined.

The Chelonia are known by a considerable number of Siwalik, and two Narbada, species. Of the land tortoises, we have, firstly, the gigantic extinct species, *Colossochelys atlas* of Falconer and Cautley, from the Siwaliks and the Irawadi. Falconer says that the fossil species is mainly distinguished from the living genus *Testudo* by the thickening of the anterior (episternal) portion of the plastron; this character was considered to be only of subgeneric value, and I think the species might well be named *Testudo atlas*. The length of the carapace, according to Falconer's restoration, is 12 feet 3 inches, and of the entire animal, with the head and tail extended, 22 feet. In addition to *Colossochelys*, there is good evidence of the former existence of other gigantic tortoises in the Siwalik period. In the Indian Museum, there are several specimens of the ankylosed episternals of tortoises belonging to two distinct species. These bones are as thick, but not so elongated, as the episternals of *Colossochelys*; they have diverging but shorter extremities than in the latter genus. The animals to which these bones belonged must have been, I think, two-thirds as large as *Colossochelys*, and may not improbably have belonged to *Testudo*. A broken episternal indicates a third, but smaller species. A fourth species is indicated by three episternals, which are not bifurcated at their free extremities: these bones indicate a smaller animal The episternal bones, from their solidity, seem more frequently preserved than any others. A single carapace of a small tortoise in the Indian Museum, from the Siwaliks, seems to belong to the genus *Testudo*. Among the hard-shelled emydine tortoises, we have, from the Siwaliks, a species of *Bellia* described by Mr.

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* Pal. Mem. Vol. I, pl. XXXII, figs. 4-7.

Theobald* under the name of *B. sivalensis*. This species, according to Mr. Theobald, is very closely allied to *B. crassicollis*, which, according to the same writer,† inhabits Tenasserim, Siam, and Sumátra. The other living species *(B. nuchalis)* inhabits Jáva. Another carapace of a Siwalik emydine, in the Indian Museum, seems to belong to a second species of *Bellia*. In labels on the casts of Siwalik fossils from the British Museum, a three-ridged carapace of an emydine bears the name of *Emys hamiltonoides* (Falc. and Caut.): this name was doubtless given from the resemblance of this carapace to that of the living *Damonia (Emys) hamiltonii*, now inhabiting Lower Bengál: the generic name of the fossil should probably be *Damonia*. An imperfect carapace, collected by Mr. Theobald in the Siwaliks of the Punjáb, and now in the collection of the Indian Museum, seems to belong to *Emys* proper. Mr. Theobald has lately described,‡ under the name of *Cautleya annuliger*, a gigantic Siwalik emydine, from the evidence of a single marginal bone; the genus is said to be distinguished from all other emydines by the cartilaginous, in place of osseous, union of the marginal with the adjoining bones. In the family *Bataguridæ*, Dr. Falconer determined the identity of a Siwalik emydine with *Pangshura (Emys) tectum* of Bell§; subsequently, the species was shown by Dr. Stoliczka‖ to occur in the newer Narbada deposits also: *Pangshura tectum* now inhabits Lower Bengál. Of the genus *Batagur*, a part of a plastron from the Narbada has been thought by Dr. Stoliczka¶ to belong very probably to *B. dhongoka*, now found living in the Narbada. Remains of a large *Batagur*, from the Siwaliks, are contained in the collection of the Indian Museum, but have not yet been specifically determined. A small carapace, with a ridge on the vertebral plates, lately presented by the Rúrki Museum to the Indian Museum, very probably belongs also to *Batagur*. Of the soft-shelled river-tortoises, a *Trionyx* from the Narbada has been thought by Dr. Stoliczka** to be not improbably identical with the living *T. gangeticus*. Plates of an undetermined *Trionyx* have been obtained in considerable numbers from the Sub-Himalayan Siwaliks, and from those of Burma and Perim Island. A carapace of an *Emyda* in the British Museum, from the Siwaliks, has been identified by Dr. Gray with the living *Emyda vittata* (*ceylonensis*, Gray). This species, according to Mr. Theobald, inha-

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[*] R. G. S. I. Vol. X, p. 43.

[†] Catalogue of Reptiles of India, p. 10.

[‡] R. G. S. I. Vol. XII, p. 186.

[§] Pal. Mem. Vol. I, p. 382.

[‖] R. G. S. I. Vol II, p. 39.

[¶] Loc. cit.

[**] Loc. cit.

bits Central and Southern India and Ceylon. In the Indian Museum there are numerous remains of *Emyda* from the Siwaliks of the Punjáb, Burma, and Perim Island, which may or may not belong to the last-named species.

General Remarks.—The foregoing notes will show that the fossil reptiles of India are noticeable for the extreme paucity of species known, and for the fragmentary remains of the known species. The Mesozoic Reptilia belong, as far as described, to extinct genera: the one known Eocene reptile (*Hydraspis*) belongs to a living genus, but one which is now far removed from India. The Siwalik (Mio-Pliocene) reptiles appear in great part to belong to living Indian genera, and in many cases to living species; the modern representatives are, however, in most cases, found no longer in the Sub-Himalayan disticts, but are now confined to Southern India. The Narbada fossil reptiles, in all probability, belong altogether to living species, and probably to species inhabiting the same district.

FOSSIL BIRDS.

Mio-Pliocene.—Fossil remains of birds have hitherto been found in India only in the Sub-Himalayan Siwaliks, and there only in comparatively small numbers. Some of their remains are in the Indian Museum, and have been partly described by myself,* while others are in the British Museum, and have been lately described by Mr. Davies.† Among the carinate birds, a tarso-metatarsus is considered by Mr. Davies to belong to a cormorant, possibly of the genus *Graculus.*‡ A species of pelican *(Pelecanus cautleyi)* is indicated by a fragment of an ulna; this bird, according to Mr. Davies, must have been somewhat smaller than the living Indian *P. mitratus.* Another part of an ulna has been referred to a new species *(Pelecanus sivalensis)* by Mr. Davies, with a reservation as to the generic determination. A gigantic wader has been described by myself, under the name of *Megaloscelornis sivalensis*, from the evidence of a sternum and tibiotarsus. A distal extremity of a large bird humerus in the Indian Museum, collected by Mr. Fedden in Sind, has a diameter of 2 inches across the condyles: I cannot at present identify this bone with the humerus of any living genus of bird: from its size it might belong to *Megaloscelornis;* it makes some approach to the humerus of *Ploteus.* A species of adjutant has been named by Milne-Edwards *Argala falconeri.*§

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* R. G. S. I. Vol. XII, p. 52.

† Geol. Mag. January 1880, p. 18.

‡ This bone was doubtfully referred by M. Edwards to *Phaëton.*

§ The bone in the British Museum referred to by myself on page 56 of the above quoted paper belongs to this species.

There are also two small undetermined bird bones in the Indian Museum. The Struthioid or Ratitian modification of bird structure appears to have been represented by three Siwalik species; *viz.*, an ostrich *(Struthio asiaticus)* indicated by some of the bones of the lower leg and foot and by vertebra: an emeu *(Dromæus sivalensis)*, by bones of the foot: and, according to Mr. Davies, a three-toed bird, intermediate between these two genera, by a single phalangeal bone. The living ostrich is confined to the African continent, and the emeu to New-Holland; the occurrence of fossil species of these genera in the higher Tertiaries of India, probably points to a late land connection between these countries.

FOSSIL MAMMALS.

Eocene.—No traces of mammals have hitherto been detected in India below the Eocene, and in the latter formation only some fragmentary bones have been obtained by Mr. Wynne in the Nummulitics of the Punjáb. The only determinable bones consist of the distal portion of the femur and metatarsals of a probably perissodactyle animal, and the astragalus of an artiodactyle.* The femur was obtained from the Nummulitic (Subáthú) zone of the Punjáb, while the astragalus was obtained immediately above the Nummulitic clays of Fatehjang in the Punjáb, which are probably of upper Eocene age. The astragalus seems certainly to be that of a ruminant, as it belonged to an animal in which the navicular and cuboid bones were united If this determination be correct, ruminants existed in the upper Eocene period.

Mio-Pliocene.—The Tertiary ossiferous rocks of Perim Island, Sind, the Punjab, the Sub-Himalayan Siwaliks, Sylhet, Tibet, and the valley of the Irawadi, have yielded a large number of mammalian and other vertebrate fossils, many of which are represented in the collection of the Society, now transferred to the Indian Museum. The fossils of the Irawadi valley were first brought to notice by Crawfurd and Clift, while those of the typical Siwaliks were rendered classic by the labours of Falconer and Cautley, and other former members of this Society. Some of these fossiliferous beds are of Miocene, and others of Pliocene age, and an admirable *resumé* of their distribution and relations are given in the 'Manual of the Geology of India,' to which work I must refer my readers desirous of further information on this subject.

The Siwalik Primates are at present known merely by a few fragments of upper and lower jaws and teeth, and it is probable that more species remain to be discovered. The known forms comprehend a large anthropoid ape, which has been named *Palæopithecus sivalensis*;† this species is known by the palate of a female and the canine of a male, and seems to have been allied to the living orang of Borneo, but is distinguished by the form of its premolars; two species of (probably) *Semnopithecus* and two of *Macacus*[*] have also been determined.

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* R. G. S. I. Vol. IX, p. 92. In that passage the words "*mammaliferous* clays," should be "*nummuliferous* clays."

† R. G. S. I. Vol. XII, p. 38.

Among the Carnivora, we have a large tiger *(Felis cristata)*[†] characterized by its large sagittal crest; a second species has lately been described by Mr. P. N. Bose under the name of *F. grandicristata*,[‡] with a still larger crest; while a third and much smaller species is indicated by a lower jaw in the Indian Museum. Of the genus *Machairodus* (*Machærodus*), there is *M. sivalensis* of Falconer and Cautley, said by Mr. Bose to be equal in size to the jaguar, and a larger species described by the same writer under the name of *M. palæindicus*. The genus *Pseudælurus*, distinguished from *Felis* by the presence of an additional lower premolar, is known by one lower jaw, which I have referred to a new species under the name of *P. sivalensis*.[§] Among the civet-like animals, we have *Viverra bakeri* of Mr. Bose, said to be closely allied to the living civet, and *Ictitherium sivalense* described by myself from a lower jaw.[||] The hyænas are represented by *Hyæna sivalensis* of Falconer and Cautley, said by Mr. Bose to present relationship both to the Indian *H. striata* and the African *H. crocuta;* and *H. felina* of Mr. Bose, distinguished by the absence of the first upper premolar. The dogs, according to the same writer, are represented by two species of *Canis (C. curvipalatus* and *C. cautleyi)*, the latter closely allied to the wolf; there is a specimen of the palate of a *Canis* in the Indian Museum, but I am at present unable to say whether it belongs to either of the above species. The genus *Amphicyon*, distinguished from *Canis* by the presence of an additional upper molar, is represented by *A. palæindicus*,[¶] remains of which have been obtained from Sind and the Punjáb. The bears are known by a single undescribed cranium of *Ursus* in the Indian Museum, and by the remarkable genus *Hyænarctos*, of which two species are known: *H. sivalensis*[**] was the original species on which the genus was founded, and has the upper molars with quadrangular crowns; a tooth apparently belonging to this species has been described by Professor Flower from the newer Pliocene (Red Crag) of

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[*] R. G. S. I. Vol. XII. p. 92.

[†] Pal. Mem. Vol. I, p. 315. In manuscript the name of *Felis palæotigris* occurs.

[‡] Of this and five other species of Siwalik Carnivora, described by the same writer, I have only seen the notice given in 'Nature,' Jan. 1st, 1880.

[§] R. G. S. I. Vol. X, p. 83.

[||] Ibid. p. 32.

[¶] Pal. Ind. Ser. X, Vol. I, p. 84. *Megalotis (Otocyon)* normally agrees with *Amphicyon* in having three upper true molars: it may, however, according to Prof. Flower, have four of these teeth.

[**] F. A. S. pl. O.

England: the second species, named by myself *H. palæindicus*,[*] is known only by an upper jaw, not yet figured; the upper molars of this species have triangularly shaped crowns, somewhat like those of *Amphicyon*. Of the subursoid Carnivora, we have the living Indian and African genus *Mellivora*, represented by *M. sivalensis*,[†] apparently very closely allied to the living Indian species. A species of badger *(Meles)* is indicated by one lower jaw collected by Mr. Theobald.[‡] Of the otters, one species of *Lutra* (*L. palæindica*) has been named by Falconer and Cautley from a skull and lower jaw[§]; another lower jaw in the Indian Museum, collected by Mr. Theobald, not improbably belongs to a second Siwalik species. *Enhydriodon*[||] is a genus peculiar to the Siwaliks, and is allied to the living sea-otter *(Enhydris)* now inhabiting the shores of the North Pacific; the Siwalik genus was not improbably a river-dwelling form.

Of the Proboscidia, now represented only by the Indian and African elephants, there were a large number of Siwalik species, belonging to the genera *Elephas*, *Mastodon*, and *Dinotherium*. Of the first-named genus, there were three sub-genera living in Siwalik times, *viz.*, *Euelephas*, *Loxodon*, and *Stegodon*. *Euelephas* was represented by *E. hysudricus*, provided with simpler molars than the living representative of the sub-genus; *Loxodon* was represented by *L. planifrons*; remarkable for being the only species of elephant in which premolars are known to have been developed. The sub-genus *Stegodon* is peculiar to South-Eastern Asia, and was represented by four species in the Sub-Himalayan and other Indian Siwaliks: these species are named *S. ganesa*, *S. insignis*, *S. bombifrons*, and *S. cliftii*. The molars of the two first are more complex than those of either of the other two, and are indistinguishable from each other; the skull of the first species is distinguished by its enormously developed tusks. The intermediate molars of *S. cliftii* have not more than six ridges each. From (probably) Pliocene deposits in China, two stegodons have been described by Professor Owen under the names of *S. sinensis* and *S. orientalis*, which appear to be respectively the same as *S. cliftii* and *S. insignis*.[¶] Of the mastodons, five species, *M. sivalensis*, *M. latidens*, *M. perimensis*, *M. pandionis*, and *M. falconeri*, have been described from the Mio-Pliocene of India: the three first-named species belong to the tetralophodont, and the two last to the trilophodont, sub-division of the genus: the two first-named species have a tendency to a pentalophodont molar formula. Of the European

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[*] R. G. S. I. Vol. XI, p. 103.

[†] Ibid. p. 102: named in 'F. A. S.' *Ursitaxus*.

[‡] R. G. S. I. Vol. XI, p. 102.

[§] F. A. S. supl. pl. Pl.

[||] Ibid.

[¶] Pal. Ind. Ser. X. Vol. I. pt. 5 (in the press.)

Miocene genus *Dinotherium*, three species, *D. indicum*, *D. pentapotamiæ*, and *D. sindiense*, have been described from the Indian Mio-Pliocene: the last species presents a remarkable approximation to the mastodons in the form of its mandible.*

The perissodactyle modification of the great order Ungulata is well represented, both in genera and species, in the Indian Mio-Pliocene. Of *Rhinoceros* there are four named species, *R. iravadicus*, *R. sivalensis*, *R. palæindicus*, and *R. platyrhinus*;† the molars of the two first are constructed on the type of those of *R. sumatrensis*; those of the last on the type of those of *R. indicus; R. sivalensis* and *R. palæindicus* were unicorn, and *R. platyrhinus* was bicorn. Bones of one species have also been obtained from Tibet. The hornless rhinoceroses were represented by *Acerotherium perimense*, of which there is a fine undescribed skull from the Punjáb in the Indian Museum.‡ It is doubtful if the genus *Tapirus* is represented in the fossil state in India; a symphysis of a mandible has been figured in the second volume of the second series of the 'Transactions of the Geological Society of London' by the late Mr. Clift, and referred to *Tapirus*, but I think the determination is at least open to doubt. Molars of *Listriodon* were described in MSS. by Falconer under the name of *Tapirus* and so published in the 'Palæontological Memoirs.'§ The genus *Listriodon*|| is represented by two species, *L. pentapotamiæ* and *L. theobaldi*. The genus *Chalicotherium* is represented by one species *(C. sivalense)*,¶ presenting some peculiar points in its dentition: this genus has till lately been classed with *Anoplotherium* among the Artiodactyla, but Professor Cope has lately come to the conclusion that it is a perissodactyle allied to *Palaeotherium*. The horses are represented by the genera *Equus* and *Hippotherium* (*Hipparion*). *Equus* is known by a Siwalik species *(E. sivalensis)*,** never fully described, and by one from the Tibetan

* For figures and descriptions of the Indian fossil Proboscidia, see F. A. S. and Pal. Ind. Ser. X, Vol. I, pt. 5 (in the press): a jaw of *D. pentapotamiæ* was described as *Antoletherium* by Falconer.

† F. A. S. and Pal. Ind. Ser. X, Vol. I.

‡ Some molars of this species were described by myself under the name of *Rhinoceros planidens*. *R. Sivalensis* has lately been made the type of a new genus *Zalabis* by Prof. Cope, but on insufficient grounds.

§ Vol. I, p. 415.

|| Pal. Ind. Ser. X, Vol. I. and R. G. S. I. Vol. XI, p. 98 I have followed Professor Cope in classing this genus with the tapirs; Kowalewsky was inclined to place it among the artiodactyles.

¶ Pal. Mem. Vol. I, pl. XVII.

** Professor Huxley (Q. J. G. S. L. 1870, Presid. Address) remarks that *some* of the Siwalik horses show traces of a "larmial" cavity on the skull. I do not know whether this remark applies to the Siwalik or Narbada horse, but probably the former as the older.

Tertiaries: of *Hippotherium*, there are two Siwalik species, *H. antilopinum* and *H. theobaldi*[*]: remains of the genus have also been obtained from Tibet. M. Gaudry remarks[†] that the Siwalik *Hippotheria* have no lateral digits; this may possibly be the case with *H. antilopinum*, but it is certainly not so with the larger *H. theobaldi*, of which there is a nearly complete tridactyle foot in the Indian Museum. *H. theobaldi* has not yet been fully described; it is very like *H. gracile*, to which species some Siwalik molars were referred by H. von Meyer[‡] under the name of *Equus primigenius*.

Of the artiodactyle modification of the Ungulata, there is a still longer list in the Indian Mio-Pliocene. In the bunodont sub-division, we have *Hippopotamus* represented by two species *(H. iravadicus* and *H. sivalensis)*, both belonging to the hexaprotodont sub-genus. A Siwalik bunodont *(Tetraconodon magnum)*[§] is noticeable for its enormous conical premolars; this genus is probably related to *Entelodon (Elotherium)* of the Tertiaries of Europe and America. The true pigs (*Sus*) are represented by three species, *S. giganteus*, *S. hysudricus*, and *S. punjabiensis;* the two former were named by Falconer and Cautley, while the last name was applied by myself.[||] *Sanitherium* is a small suine animal, only known by the lower molars. *Hippohyus* is a genus of suine animals whose molars present a peculiar complexity of pattern, recalling that of the molars of the horse; the genus is peculiar to the Siwaliks, where it appears to have been represented by two species.[¶] The European Miocene genus *Hyotherium* is represented in the Tertiaries of Sind and Perim Island by a species which I have provisionally named *H. sindiense*.[**] Of the suine animals with selenodont teeth, we have, among the forms with five cusps on the molars, a species of *Anthracotherium (A. silistrense)*[††] from Sind, the Punjáb, and Sylhet, and a species of *Hyopotamus (H. sindiense)*[‡‡] from Sind: among the forms characterized by having only four cusps on the molars, we have four genera, *Merycopotamus*, *Chœromeryx*, *Hemimeryx*, and *Sivameryx*,[§§] all peculiar to the Sind and Punjáb Siwaliks, and each known only by a single species:[||||] the two last genera are at present undescribed.

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[*] Milk-molars of this species were at first referred to a new genus, *Sivalhippus*, by myself (R. G. S. I. vol. X. pp. 31. 82).

[†] "Animaux Fossiles and Geologie dè l'Attique" p. 231.

[‡] Palæontographica, Vol. XV, p. 17.

[§] Pal. Ind. Ser. X, Vol. I.

[||] R. G. S. I. Vol. XI, p. 81. A suine animal has been named by myself *Hippopotamodon*, but I am now not certain of its generic distinctness.

[¶] Ibid. p. 82.

[**] Ibid p. 77.

[††] Ibid. p. 78, a jaw of this species was described by me as *A. punjabiense*.

[‡‡] Ibid Vol. X, p. 77.

[§§] Ibid. Vol. XI, pp. 78, 80.

[||||] Falconer in a MS. note described some teeth of *Dorcatherium*, under the name of *Merycopotamus nanus*. (Pal. Ind. Ser. X, Vol. I.)

Among the true ruminants, we have the deer family represented by several species of *Cervus*, namely, *C. triplidens*, *C. simplicidens*, and *C. latidens;* the genus of the last being somewhat doubtful. A fourth undescribed species has been named *C. sivalensis.** The genus *Dorcatherium* is represented by the two species, *D. majus* and *D. minus.*† At least one of the Siwalik deer had branching antlers with a flattened beam, somewhat like those of the living *C. duvaucellii.* *Cervus triplidens* had a large accessary column in the molars, while *C. simplicidens* was a species as large as the Káshmir stag, with a much smaller accessory molar column. A single molar in the Indian Museum seems to indicate a Siwalik representative of the genus *Palæomeryx.* The giraffes were represented in India by probably two species, one of which has been named *Camelopardalis sivalensis.*‡ Of the family Sivatheriidæ, which, with the exception of *Helladotherium*§ from the Pikermi beds of Attica, is peculiar to India, we have four genera in the Mio-Pliocene. *Hydaspitherium* is represented by probably three species, *H. megacephalum* known by the skull, which carried a massive conjoint horn-base above the occiput; and *H. leptognathus* and *H. grande*, by lower jaws and teeth. *Bramatherium perimense* is known by the skull, teeth, and jaws; this species seems to have carried a pair of horns over the occiput and a large conjoint horn-base on the frontals. *Vishnutherium iravadicum* is at present only known definitely by a fragment of a lower jaw from Burma of much smaller size than any of the other genera: it is not impossible, however, that some nondescript upper molars, in the Indian Museum, from the Punjáb, may belong to this genus. *Sivatherium giganteum* was the first known of this group of animals, and was originally described in the Society's Journal‖ as a fossil elk: several skulls of this species are known; the male carried two pairs of horns, placed like those of the living Indian four-horned antelope (*Tetraceros*), while the female was hornless. An elaborate memoir on this interesting animal has been published by Dr. Murie.¶ The molar teeth seem to be nearest to those of the giraffes, and also approach those of *Cervus megaceros* and *Alces:* Dr. Murie comes to the conclusion that the horns of *Sivatherium* were intermediate in structure between the antlers of deer and the horns of the true cavicorn ruminants, and that they probably carried a deciduous sheath like those of the living American prong-buck (*Antilocapra*). Of the antelopes, several species have been described, the largest of which (*A. palæindica,*)[*] is supposed to have presented affinities to some African forms; *A. sivalensis*[†] is allied to the Indian blackbuck (*A. cervicapra*); while *A. patulicornis* and *A. acuticornis* do not appear to come close to any living forms. Other molar teeth belong to a species of *Portax*, now only represented by the living nilghai of India. Others again are like those of *Palæoryx*, a genus of antelopoid animals described from the Pikermi beds of Attica; this determination, owing to the absence of skulls and the great difficulty of precisely determining isolated ruminant teeth, is only provisional. The oxen are represented by five genera, among which *Hemibos* is represented by three species, *H. occipitalis*, *H. acuticornis*, and *H. antilopinus*:[‡] this genus is peculiar to the Siwaliks, and connects the oxen and antelopes. *Leptobos falconeri* is another species of antelopoid oxen, known by some crania. The genus *Bubalus* is represented by *Bubalus platyceros*, a species with horns concave superiorly; and, in the highest Siwalik, by *B. palæindicus*, which is extremely close to the living wild buffalo of Assam. Of the genus *Bison*, there is only one species in the Siwaliks, which has been named *B. sivalensis*, and which seems to have been related to the extinct European *B. priscus*. Of the true oxen (*Bos*) there are three Siwalik species, namely, *Bos acutifrons* remarkable for its enormous horns and angulated forehead; *B. planifrons* with shorter horns and a flattened forehead, and allied to the gigantic *Bos primigenius* of Europe; and *Bos platyrhinus* only known by the lower half of a skull, and of which the generic affinities are doubtful. There seem to have been four species of goats in the Indian Tertiaries, most of which are probably of Pliocene age, *viz.*, an unnamed species with horn-cores very like those of the Himalayan *Capra falconeri* (markhor), and two named species, *C. sivalensis* and *C. perimensis*, both of which are only known by frontlets and horn-cores: the fourth species has been described by Professor Rütimeyer under the name of *Bucapra daviesii*. No remains of the genus *Ovis* have hitherto been described from the Sub-Himalayan or other Indian Siwaliks, but a cranium obtained from the presumably Siwalik strata of Tibet has been referred by the late Mr. Blyth to this genus. The genus *Camelus* is known by *C. sivalensis*, which presents a peculiarity in the lower molars, connecting it with the American auchenias, and distinguishing it from the other old-world camels.* The similarity of the lower molars of the Siwalik camel and *Auchenia* is very noteworthy, since America is supposed to have been the original home of the *Camelidæ*: this supposition is supported by the connection between the living American camels *(Auchenia)* and the Pliocene old-world camels.

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* Pal. Ind. Ser. X, Vol. I, Preface (in the press).

† Ibid.

‡ Remains of this species were described under the names of *C. sivalensis* and *C. affinis* by Falconer. See R. G. S. I. Vol. XI, p. 83.

§ Pal. Ind. Ser. X, Vol. I, R. G. S. I. Vol. XI, p. 90. M. Gaudry in his work, 'Les Enchainements du Monde Animal,' mentions that *Helladotherium* occurs in India: I am unacquainted on what grounds.

‖ Vol. IV, p. 506.

¶ Geol. Mag. Vol. VIII, p. 438.

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[*] Pal. Mem. Vol. I, pl. 23.

[†] Pal. Ind. Ser. X, Vol. I. Two species (*A. picta* and *A. gyricornis,*) were named in MSS. by Falconer.

[‡] These three species have been also described under the generic names of *Probubalus*, *Amphibos*, and *Peribos*; the synonomy will be found in the first volume of the tenth series of the 'Palæontologia Indica,' where all the other Indian fossil ruminants are noticed. Part of this volume is still in the press.

The other orders of Mammalia are only represented by a few species of Rodentia and one of Edentata. Among the rodents, a rat (*Mus*) is mentioned by Falconer as a member of the Siwalik fauna. A species of bamboo-rat *(Rhizomys sivalensis)*† has been named by myself, from some lower jaws collected by Mr. Theobald in the Punjáb. A porcupine *(Hystrix sivalensis)* is known by a part of a cranium and a lower jaw.

The edentates are only known by one species of pangolin *(Manis sindiensis)*, which has been named on the evidence of a solitary phalangeal bone from Sind.‡

The Mio-Plocene mammalian fauna of India, as a whole, is characterized by the great number of forms belonging to the orders including animals of large corporeal bulk, and also by the admixture of modern African and Miocene European genera with those now peculiar to India. The Proboscidia and the perissodactyle Ungulata, now so sparingly represented on the globe, were abundant in Mio-Pliocene India, and were probably the dominant forms: the ruminants have now diminished somewhat in numbers in several groups, but not to such a striking extent as the proboscidians. The selenodont hogs, like *Merycopotamus* and *Anthracotherium*, belong to a group which has completely passed away, while their congener the hippopotamus is now confined to Africa. Of the larger mammals now inhabiting India, nearly all are generically represented in the Pliocene, while forms, like *Anoa* (the living representative of *Hemibos)*, inhabiting neighbouring countries seem to have descended from Indian ancestors. The micro-mammalia are practically unrepresented in the Mio-Pliocene, but this is probably due to the smaller chance of their remains being preserved in a fossilized condition, or, if so preserved, of being discovered.

PLEISTOCENE.

The mammals of the Pleistocene of India are as yet even less well known than those of the Mio-Pliocene, owing to the smaller areas in which they are found. It seems, however, even with our present knowledge, to be pretty safe to say that the numerical strength of species of the larger mammals so characteristic of the Mio-Pliocene had disappeared in the Pleistocene. From the older alluvium of the Jamna river, mammalian bones have been obtained in considerable quantities, but only two species have been satisfactorily determined; the remaining bones have only been generically named, and are, therefore, not referred to here, as it is in many cases impossible to say whether they belong to living or to extinct species. The presence of *Hippopotamus* remains in a stratum is pretty good evidence of such stratum being not newer than the Pleistocene. The discovery of a molar and canine of this genus in the alluvia of the Pemganga river, by Mr. Fedden, consequently shows that some of those deposits should be referred to the Pleistocene. In many cases, as in the delta of the Ganges, it is often most difficult, or impossible, to draw the line between the Pleistocene deposits and the Recent alluvium of the same area.

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* A second species of Siwalik camel was named in MSS. *C. antiquus* by Falconer. This species cannot now be identified.

† For descriptions of this and other Siwalik rodents, see R. G. S. I. Vol. XI, p. 100. *Rhizomys* is probably the same as *Typhlodon* of Falconer.

‡ Pal. Ind. Ser. X, Vol. I.

In the laterite of Madras, stone implements, and a human tibia have been found by Mr. Foote, and are assigned to the Pleistocene by Professor Boyd-Dawkins. Stone implements have likewise been obtained from the ossiferous beds of the Narbada valley, in association with the remains of extinct mammals. The mammalian fauna of the Narbada beds comprises, among the Carnivora, a species of bear *(Ursus namadicus)*, named by the authors of the 'Fauna Antiqua Sivalensis' on the evidence of a portion of the maxilla with the molar dentition: this specimen is now in the British Museum, presented by Captain Frazer.[*] Among the Proboscidia, we have the extinct *Euelephas namadicus*, characterized by the extraordinary ridge on the forehead; the molars of this species are very like those of the European *Elephas antiquus*, from which Professor Leith Adams has thought that the Indian and European forms might belong to the same species. *Stegodon* was represented by *S. ganesa* and, possibly, by *S. insignis*. Among the fossil perissodactyles of the Pleistocene, we have *Rhinoceros deccanensis*[†] of Mr. Foote from the Deccan, a species without permanent lower incisors, and shewing African affinities; and from the Narbada the living *R. indicus*, remains of which were at first named *R. namadicus*. A third species *(R. namadicus)* probably also existed in the Pleistocene. The horses are represented by *Equus namadicus*,[‡] as yet not fully described. Among the artiodactyles, we find two species of *Hippopotamus*, one of which (*H. namadicus*) belongs to the hexaprotodont type, while the other (*H. palæindicus*) is tetraprotodont, like the larger living species;[*] *H. palæindicus* has also been found in the older alluvia of the Jamna. The pigs seem to have been represented by *Sus giganteus*.[†] A species of stag was named by Falconer *Cervus namadicus*, but never described; a single molar from the Narbada in the Indian Museum is indistinguishable from the corresponding tooth of the living *C.* (*Rucervus*) *duvaucellii*. Three species of Narbada oxen have been described, *viz.*, *Bos namadicus* of Falconer and Cautley, a taurine ox showing some affinities to the living Asiatic genus *Bibos*, also occurring in the Pem-ganga alluvium and, possibly, in the Deccan; *Bubalus palæindicus* of the same authors, very closely allied to the living wild Indian buffalo, also found in the Jamna alluvium; and *Leptobos frazeri* of Professor Rütimeyer. A species of nilghai (*Portax*) has lately been described by the same writer from the Narbada rocks, under the name of *P. namadicus;* teeth of the same genus have also been obtained from the Pem-ganga alluvium.

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[*] F. A. S. plate O. I have elsewhere mentioned a species of *Felis* from the Narbada beds, the determination having been made on the evidence of the olecranal portion of an ulna in the old collection of the Geological Survey; the history of the specimen is, however, unknown, and from its mineral condition I am by no means sure that it is from the Narbada.

[†] Pal. Ind. Ser. X, Vol. I.

[‡] Faun. Ant. Siv. *E. palæonus* seems to be the young of *E. namadicus*.

The Pleistocene rodents are only represented by some incisors probably belonging to the genus *Mus*, obtained from the Narbada valley, and now in the Indian Museum.

RECENT.

The Recent deposits have not yet, as I have said, in many cases been satisfactorily separated from the Pleistocene, and the very local occurrence of mammalian bones renders this point of doubt one not likely to be soon cleared up. Any alluvial deposits of bones from which *Hippopotamus* is absent, and which do not contain any other extinct animals, I should be disposed to class as Recent.

Human remains have been obtained in the alluvium of the plains in various localities, at considerable distances below the surface, but generally in very imperfect condition. Specimens of the teeth and jaws of *Macacus rhesus* are exhibited in the Indian Museum, obtained from the alluvia of Assam and Madras; those from the former locality are in a highly mineralised condition. Molars of the Indian elephant have been obtained in the alluvium of the plains of India, and in that of the delta of the Irawadi. A last upper molar of *Rhinoceros indicus* has been obtained by Mr. Foote in the alluvium of Madras: this specimen is very interesting as shewing the former range of that species far to the south of its present habitat, which Jerdon gives as "the Terai from Bhotan to Nepal." *Sus*

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[*] The smaller Liberian hippopotamus (*Chæropsis*) has only two lower incisors.

[†] The authority for introducing this species in the Narbada fauna is the specimen drawn in plate LXX, fig. 8. of the F. A. S.

indicus has also been obtained by Mr. Foote in the same formation. *Antilope cervicapra* is represented by a fossil horn-core in the Indian Museum whose exact locality is uncertain. Antlers, horn-cores, and teeth of species of *Bos* and *Cervus* have been obtained from alluvia of various parts of the plains, and from raised beaches on the Kattiawar (Kattywar) coast; as, however, these specimens are not yet specifically determined, no more can be said about them.

LIST OF THE FOSSIL VERTEBRATA OF INDIA AND BURMA.

The following list exhibits in a systematic form all the well-established species of Indian and Burman fossil vertebrata, together with the best authenticated of the unnamed species with which I am acquainted. For the great divisions of geological times, the terms Anthropozoic (Age-of-Man), Theriozoic (Age-of-Mammals), Saurozoic (Age-of-Reptiles), and Ichthyozoic (Age-of-Fishes), have been employed in lieu of the old terms Post-Tertiary, Kainozoic, Mesozoic, and Palæozoic, as being more applicable to a chronology of vertebrate evolution, and as forming a series of symmetrical terms.

I. ANTHROPOZOIC (POST-TERTIARY).

1. RECENT ALLUVIA.

MAMMALIA.	PRIMATES.	Homo (sapiens ?). Plains.
		Macacus rhesus. Gúlpara and Madras.
	PROBOSCIDIA.	Euelephas indicus. India and Burma.
	UNGULATA.	Rhinoceros indicus. Madras.
		Sus indicus. Madras.
		Cervus. Kattiawar.
		Antilope cervicapra. Ganges Valley. (?)
		Bos. sp. Kattiawar and Plains.
REPTILIA.	CHELONIA.	? (plates) Calcutta.

Other undetermined remains of, probably, recent species.

2. PLEISTOCENE.

MAMMALIA.	PRIMATES.	Homo. sp. Narbada (weapons) and Madras (weapons and bones).
	CARNIVORA.	Ursus namadicus. (F. and C.) Narbada.
	PROBOSCIDIA.	Euelephas namadicus. (F. and C.) Narbada.
		Stegodon ganesa. (F. and C.) Narbada.
		——— ? insignis. (F. and C.) Narbada.
		? Mastodon pandionis. (Falc.) Deccan.
	UNGULATA.	Rhinoceros deccanensis. (Foote.) Deccan.
		——— indicus. (Cuv.) Narbada.
		——— namadicus. (F. and C.) Narbada.
		Equus namadicus. (F. and C.) Narbada.

MAMMALIA.	UNGULATA.	Hippopotamus namadicus. (F. and C.) Narbada.
		——— palæindicus. (F. and C.) Nar. and J.
		——— sp. P: G.
		Sus giganteus. (F. and C.) Narbada.
		Cervus sp (? duvancellii) (Narbada).
		Bubalus palæindicus (F. and C.) Narbada and J.
		Bos namadicus. (F. and C.) Narbada. P: G. and (?) Deccan.
		Leptobos frazeri. (Rüt.) Narbada.
		Portax namadicus. (Rüt.) Narbada. and P: G.
	RODENTIA.	Mus. sp. Narbada.
REPTILIA.	CROCODILIA.	Crocodilus (?) sp. Narbada.
	CHELONIA.	Pangshura tectum. (Bell. sp.) Narbada.
		Batagur (? dhongoka) Narbada.
		Trionyx (? gangeticus.) Narbada.

II. THERIOZOIC (KAINOZOIC.)

1. PLIO-MIOCENE.

MAMMALIA.	PRIMATES.	Palæopithecus sivalensis. (Lyd.) S.
		Macacus sivalensis. (Lyd.) S.
		——— sp. S.
		Semnopithecus subhimalayanus. (Myr.) S.
		——— sp. S.
	CARNIVORA.	Felis cristata. (F. and C.) S.
		——— grandicristata. (Bose.) S.
		——— sp. S.
		Machairodus sivalensis. (F. and C.) S.
		——— palæindicus. (Bose) S.
		Pseudælurus sivalensis. (Lyd.) S.
		Ictitherium sivalense. (Lyd.) S.
		Viverra bakerii. (Bose.) S.
		Hyæna sivalensis. (F. and C.) S.
		——— felina. (Bose.) S.
		Canis curvipalatus. (Bose.) S.
		——— cautleyi. (Bose.) S.
		Amphicyon palæindicus. (Lyd.) S. Sd.
		Ursus. sp. S.
		——— sp. I.
		Hyænarctos sivalensis. (F. and C.) S. Sd.
		——— palæindicus. (Lyd.) S.
		Mellivora sivalensis. (F. and C.) S.
		Meles, *sp.* (Lyd.) S.

MAMMALIA. CARNIVORA. Lutra palæindica. (F. and C.) S.
Enhydriodon sivalensis. (F. and C.) S.
PROBOSCIDIA. Euelephas hysudricus. (F. and C.) S.
Loxodon planifrons. (F. and C.) S.
Stegodon ganesa. (F. and C.) S.
——— insignis. (F. and C.) S.
——— bombifrons. (F. and C.) S.
——— cliftii. (F. and C.) S.
Mastodon sivalensis. (F. and C.) S.
——— latidens. (F. and C.) S. I. Sd. P.
——— perimensis. (F. and C.) S. Sd. P.
——— pandionis. (F.) Sd. S. P.
——— falconeri. (Lyd.) Sd. S.
Dinotherium indicum. (Falc.) S. P.
——— pentapotamiæ. (Falc.) S.
——— sindiense. (Lyd.) Sd. S.
UNGULATA.
Perissodactyla.
Chalicotherium sivalense. S. Sd.
Rhinoceros iravadicus. (Lyd.) I.
——— palæindicus. (F. and C.) S.
——— platyrhinus. (F. and C.) S.
——— sivalensis. (F. and C.) S. Sd.
——— sp. Tibet.
Acerotherium perimense. (F. and C.) P. Sd. S. I.
Listriodon pentapotamiæ. (Falc. sp.)
——— theobaldi. (Lyd.) S.
(?) Tapirus, sp. (Clift.) I.
Equus sivalensis. (F. and C.) S.
——— sp. Tibet.
Hippotherium antilopinum. (F. and C.) S.
——— theobaldi. (Lyd.) P. S. Sd.
——— sp. Tibet.
Artiodactyla.
Hippopotamus iravadicus. (F. and C.) I.
——— sivalensis. (F. and C.) S.
Tetraconodon magnum. (Falc.) S.
Sus giganteus. (F. and C.) S.
— hysudricus. (F. and C.) S. P. Sd.
— punjabiensis. (Lyd.) S.
Hippohyus sivalensis. (F. and C.) S.
——— sp. S.
Sanitherium schlagintweitii (Myr.) S.
Hyotherium sindiense (Lyd.) Sd.
Anthracotherium silistrense. (Pent.) Sy. S. Sd.
Hyopotamus palæindicus. (Lyd.) Sd.

MAMMALIA. UNGULATA.

Artiodactyla.

Merycopotamus dissimilis. (F. and C.) S.
Chæromeryx silistrensis. (Pom.) Sy.
Hemimeryx, sp. (Lyd.) Sd.
Sivameryx, sp. (Lyd.) Sd.
Cervus triplidens. (Lyd.) S.
——— sivalensis. (Lyd. Mss.) S.
——— simplicidens. (Lyd.) S.
——— (?) latidens. (Lyd.) S.
Dorcatherium majus. (Lyd.) S.
——— minus. (Lyd.) S.
Palæomeryx, sp. (Lyd.) S. Sd. (?)
Camelopardalis sivalensis. (F. and C.) S. P.
——— sp. S.
Hydaspitherium grande. (Lyd.) S.
——— leptognathus. (Lyd.) S.
——— megacephalum. (Lyd.) S.
Bramatherium perimense. (Falc.) P.
Sivatherium giganteum. (F. and C.) S.
Vishnutherium iravadicum (Lyd.) I. S. (?)
Antilope palæindica. (F. and C.) S.
——— patulicornis. (Lyd.) S.
——— porrecticornis. (Lyd.) S.
——— sivalensis. (Lyd.) S.
? Palæoryx, sp. (Lyd.) S.
Portax, sp. (Lyd.) S.
Hemibos occipitalis. (Falc. sp.) S.
——— acuticornis. (Falc. sp.) S.
——— antilopinus. (Falc. sp.) S.
Leptobos falconeri. (Rüt.) S.
Bubalus platyceros. (Lyd.) S.
——— palæindicus. (F. and C.) S.
Bison sivalensis. (Falc. MSS.) S.
Bos acutifrons. (Lyd.) S.
—— planifrons. (Lyd.) S.
—— platyrhinus. (Lyd.) S.
Bucapra daviesii. (Rüt.) S.
Capra perimensis. (Lyd.) P.
—— sivalensis. (Lyd.) S.
—— sp. (Lyd.) S.
? Ovis, sp. (Blyth.) S. T.
Camelus sivalensis. (F. and C.) S.

MAMMALIA.	RODENTIA.	Mus, sp. S.
		Rhizomys sivalensis. (Lyd.) S.
		Hystrix sivalensis. (Lyd.) S.
	EDENTATA.	Manis sindiensis. (Lyd.) Sd.
AVES.	CARINATÆ.	Graculus (?), sp. (Dav.) S.
		Pelecanus cautleyi. (Dav.) S.
		——— ? sivalensis. (Dav.) S.
		Megaloscelornis sivalensis (Lyd.)
		Megaloscelornis. (?) sp. Sd.
		Argala falconeri (M. Ed.) S.
	RATITÆ.	Struthio asiaticus. (M. Ed.) S.
		Dromæus sivalensis. (Lyd.) S.
		Gen. indet. (Brit. Mus. Col.) S.
REPTILIA.	CROCODILIA.	Crocodilus palustris (Less.) S. P.
		——— sp. I.
		Gharialis gangeticus (Gmel.) S. Sd. I.
		——— leptodus (F. and C.) S.
		——— crassidens. (F. and C.) S. Sd.
	LACERTILIA.	Varanus sivalensis. (Falc.) S.
	OPHIDIA.	Gen. indet. S. Sd.
	CHELONIA.	Colossochelys atlas. (F. and C.)
		Testudo (?), 5 sp. S.
		Bellia sivalensis. (Theo.) S.
		——— sp. S.
		Damonia hamiltonoides. (Falc. sp.) S.
		Emys, sp. S.
		Cautleya annuliger. (Theo.) S.
		Pangshura tectum. (Bell. sp.) S.
		Batagur, sp. S.
		Trionyx, sp. S. I. P.
		Emyda vittata. (Pet.) S.
		——— sp. S. I. P.
PISCES.	ELASMOBRANCHII.	Carcharias, sp. I.
		Lamna, sp. Sd.
		? (vertebræ.) P.
	?	? (palatal teeth) S. Sd.
	TELEOSTEI.	Chaca (?), sp. S.
		? (vertebræ.) S. Sd.

2. EOCENE (INTRATRAPPEAN AND NUMMULITIC).

MAMMALIA.	UNGULATA.	(perissodactyle femur). Punjáb.
		(artiodactyle astragalus) Punjáb.

REPTILIA.	CROCODILIA.	(teeth and vertebræ) Punjáb.
	CHELONIA.	Hydraspis leithii (Carter sp.) Bombay.
BATRACHIA.	ANOURA	Oxyglossus pusillus. (Owen. sp.) Bombay.
		——— (?) sp. Bombay.
PISCES.	ELASMOBRANCHII.	Myliobatis, sp. (Lyd.) Punjáb.
	TELEOSTEI.	Diodon foleyi, (Lyd.) Ramri I. and Pt. Blair.
		Capitodus indicus. (Lyd.) Punjáb.
		? (Cycloid scales) Nr. Thayetmyo.

III. SAUROZOIC (MESOZOIC).

1. CRETACEOUS SERIES.

REPTILIA.	DINOSAURIA.	Megalosaurus, sp. (Lameta and Trichinopoli)
		Titanosaurus blanfordi. (Lyd.) Lameta gp.
		——— indicus. (Lyd.) Lameta gp.
		? (unknown reptile.) Lameta gp.
	CROCODILIA.	(amphicælian sp.) (Lyd.) Sind.
	CHELONIA.	? (plates.) Lameta, Rajamahendri, and Sind.
	ICHTHYOSAURIA.	Ichthyosaurus indicus. (Lyd.) Trichinopoli.
PISCES.	ELASMOBRANCHII.	Corax incisus. (Eg.) Trichinopoli.
		—— pristodontus. (Ag.) Trichinopoli.
		Enchodus serratus. (Eg.) Trichinopoli.
		Lamna complanata. (Eg.) Trichinopoli.
		—— sigmoides. (Eg.) Trichinopoli.
		Odontaspis constrictus. (Eg.) Trichinopoli.
		——— oxypeion. (Eg.) Trichinopoli.
		Otodus basalis. (Eg.) Trichinopoli.
		——— divergens. (Eg.) Trichinopoli.
		——— marginatus. (Eg.) Trichinopoli.
		——— minutus. (Eg.) Trichinopoli.
		——— nanus. (Eg.) Trichinopoli.
		——— semiplicatus. (Eg.) Trichinopoli.
		Oxyrhina triangularis. (Eg.) Trichinopoli.
		——— sp. (Stol.) Trichinopoli.
		Ptychodus latissimus. (Ag.) Trichinopoli.
	GANOIDEI.	Pycnodus (?), sp. (Stol.) Trichinopoli.
	?	? (scales) Lameta.
	?	? (scales) Intratrappean. Rajamahendri.

2. JURA-TRIASSIC SERIES.

REPTILIA.	DINOSAURIA.	Ankistrodon indicus (Hux.) Panchet gp.
	CROCODILIA.	(amphicælian sp.) (Lyd.) Chari gp.

REPTILIA.	Crocodilia.	Parasuchus, sp. (Hux.) (hislopii. MSS.) Maleri gp.
		—— ? sp. (Lyd.) Denwa gp.
	Lacertilia.	Hyperodapedon, sp. (Hux.) Maleri gp.
	Dicynodontia.	Dicynodon orientalis. (Hux.) Panchet gp.
		——— sp. Panchet gp.
	Plesiosauria.	Plesiosaurus indicus (Lyd.) Umia. gp.
BATRACHIA.	Labyrinthodontia.	Brachyops laticeps. (Ow.) Mangli. gp.
		Gonioglyptus longrostris. (Hux.) Panchet gp.
		Pachygonia incurvata (Hux.) Panchet gp.
		Archegosaurus (?) Bijori gp.
PISCES.	Dipnoi.	Ceratodus hislopianus. (Old.) Maleri gp.
		——— hunterianus. (Old.) Maleri gp.
		——— virapa. (Old.) Maleri gp.
	Ganoidei.	Dapedius egertoni. (Syk.) Kota gp.
		Lepidotus breviceps. (Eg.) Kota gp.
		——— calcaratus. (Eg.) Kota gp.
		——— deccanensis. (Eg.) Kota gp.
		——— longiceps. (Eg.) Kota gp.
		——— pachylepis. (Eg.) Kota gp.
		Tetragonolepis analis. (Eg.) Kota gp.
		——— oldhami. (Eg.) Kota gp.
		——— rugosus. (Eg.) Kota gp.
?	?	(Scales) Sripermatúr gp. Kota gp.

IV. ICHTHYOZOIC (PALÆOZOIC).

1. Carboniferous.

PISCES.	Ganoidei.	Sigmodus dubius. (Waag.)	Salt-range.
	Elasmobranchii.	Poecilodus paradoxus. (Waag.)	Salt range.
		Psephodus indicus. (Waag.)	do.
		Helodopsis elongata. (Waag.)	do.
		——— abbreviata. (Waag.)	do.
		Psammodus, sp.	do.
		Petalorhyncus indicus. (Waag.)	do.
		Xystracanthus gracilis. (Waag.)	do.
		——— major. (Waag.)	do.
		——— giganteus. (Waag.)	do.
		Thaumatacanthus blanfordi. (Waag.)	do.

Abbreviations used in the above.

Ag. = Agassiz ; Dav. = Davies ; Eg. = Egerton ; F. and C. = Falconer and Cautley ; Gmel. = Gmelin ; Hux. = Huxley ; I. = Irawadi

(Irrawaddy) valley, Burma; J. = Jamna; Less. = Lesson; Lyd. = Lydekker; M. Ed. = Milne-Edwards; Myr. = Herman von Meyer; Old. = Oldham; Ow. = Owen; P. = Perim Island, gulf of Cambay; Pent. = Pentland; P: G. = Pem-ganga; Pet. = Peters; Pom. = Pomel; Rüt. = Rütimeyer; S. = Siwaliks (including Punjáb); Sd. = Sind; Stol. = Stoliczka; Sy. = Sylhet; Syk. = Sykes; T. = Tibet; Theo. = Theobald; Waag. = Waagen.

CONCLUSION.

In the foregoing sketch of the fossil vertebrata of India, but few new facts have been recorded, and, indeed, the main objects in penning it were the hope, firstly, of inducing persons interested in scientific enquiries to aid us in our endeavours to increase our knowledge of this interesting branch of science, and, secondly, of making one of those landmarks, so necessary in an ever-increasing subject like the present, from whence new advances can again be made. With regard to the first object, it may be observed that District Officers in India, and other officials, in the course of their periodical professional tours through the country, have far greater opportunities of collecting the larger and more conspicuous fossils than can possibly fall to the lot of the officers of the Geological Survey of India, who are few in number, and who, for years together, are not called upon to visit many parts of the country. To all who have opportunities of travelling through unfrequented parts of India likely to contain fossil remains, the appeal is here made for assistance in our endeavours to obtain a more complete knowledge of the fossil vertebrata of India. Any fossils sent to the Superintendent of the Geological Survey of India (Calcutta) will be most gratefully received, and, after comparison or description, either returned to their owners, or, if presented, carefully preserved in the collection of the Indian Museum.

Note.—Additions to this paper have been made while it was passing through the press, bringing it up to date.

V.—*Account of the Verification of some Standard Weights with considerations on Standard Weights in general.*—*By* Col. J. F. Tennant, R. E., F. R. S., *Master of Her Majesty's Mint.*

(Recd. Jan. 5th;—Read Feb. 4th, 1880.)

When I first contemplated the verification of a series of weights from a primary standard, I had little information as to procedure, and indeed I have till now had little as to details. I had intended in this paper to deal with the verification of a whole series of ounce weights; but circumstances beyond my control have delayed the latter portion, and I think that probably this shorter paper will be as much as the patience of my readers will stand: in it are described, with examples, all the cases I shall meet; while the explanations will, I trust, enable any one to follow my procedure and somehow to verify any other set of weights. This end being gained, the delay of the paper to add the numerical results of farther work, would add little to its popular, or even scientific value, and this circumstance has induced me to offer it in its present state to the Asiatic Society.

I am aware that I am open to the charge of excessive (factitious) accuracy, and I freely admit that I have used an excessive number of decimal places; but the number was originally fixed by the fact that it caused no trouble and saved thought. The difference between the trouble of dealing with 5 or 6 figures and 4 with an arithmometer is, in my case, more than compensated by the absence of the absolute necessity of watching the increase of the last figure: and too, I had not, till I had gone some way with these weighings, so clear an idea of the probable errors as I now have. The systematic calculation of these is, so far as I know, new: it has taught me much, and guided me where I might have gone wrong. I think that it should always be carried out; but of course, the foundation of the calculation—the estimation of the probable error of one comparison, will not commend itself to all men:—those who in other respects may follow my procedure may prefer a different course in this, and, when the system of weighment is different, this datum must be determined in a correspondingly different manner. Even then, I hope, that the conclusions I have come to may have their use, for the evidence they offer of the rapid accumulation of error in multiplying from a small primary standard, is quite independent of the amount ascribed to the error of one comparison.

I have added the Tables requisite in reducing the comparison of weights of varying density and in determining specific gravity. These are deduced from the same data precisely as those used in the British Standards Department, but I have employed Fahrenheit's thermometer, the English inch, and the English grain, because, to me, those units were more accessible (as they will be to most readers of the English language) and not because I prefer them. I have thought that it was more important to avoid conversions of the data before using them than to adhere to general considerations; just as (with the late Warden of the Standards) I have preferred uniformity of data for reduction; rather than a possible scientific accuracy, which is, after all, not demonstrably gained.

SECTION I.—*On Weights.*

In May 1879, I received from England a set of Bullion Weights of gilt bronze, with their errors on the Commercial Standard of England roughly given, and a Troy Ounce of Platinum-iridium, with its error in vacuo in terms of the Parliamentary Standard Pound P S. I at the same time received a set of Metric Weights of Platinum-iridium from 100 grammes to one milligram, with their errors in terms of the Kilogramme des Archives, which is the Normal Standard weight of France. My paper here will be confined to dealing with some of the Bullion Weights: and it will be necessary in order to understand the procedure I follow, and also the scientific principles of weighing, that I should give an account of the English system of weights.

Ordinary weights are made of brass, iron, or some other cheap metal, but all these are liable to oxidation, and thus none of these metals is suitable for a Standard. The metal chosen for the English Standard was platinum, which is nearly indestructible. Since then it has been found that, whereas platinum is soft, an alloy with iridium is hard, has the other advantages of platinum, and can be made with sufficient readiness for the purpose required: this alloy is used in my Primary Standards as it is in the European Standards now being made in Paris. The use of such substances for Standard Weights, however, leads to some complication: these metals are heavy; while the metals and alloys ordinarily used are comparatively light. Now the weight of a body in air is different from its weight in vacuo by the weight of the air displaced, and this varies with the state of the atmosphere: consequently the relative weight of a pound of brass and one of platinum, which are alike in vacuo, will, in air, be found to vary continually relatively to each other. In order to avoid the inconvenience of this, it has been found desirable that the Commercial Standard should be of brass or bronze; both of which, having nearly the same density as the metals used in ordinary weights, will show the same differences at all times and places, with sufficient accuracy for commercial purposes; and which, moreover, are cheap enough to allow of the weights of all sizes being made of them. For general Standard purposes, weights are now made of gilt bronze, the gilding preserving them to a great extent from changing by oxidation.

As the Parliamentary Standard of England P S. has its true weight in vacuo,* the first impression would be, that the Commercial Standard in ordinary air should weigh the same as P S. in vacuo: but this has not been the practical solution. When the Houses of Parliament were destroyed in 1834, the English standards were destroyed in them, and the new Standard was meant to be a restoration of the old one. Now the old Standard was a brass Troy Pound made in 1758, of which there were a variety of copies more or less accurate. On the evidence from these, and some other sources, was determined the difference between the lost pound and a piece of platinum, both taken in vacuo. Then (the Government of the day having determined that the new Standard should represent the Avoirdupois, and not the Troy Pound as before), a second piece of Platinum P S. was made which should weigh very nearly 7000 such grains as those of which the destroyed Pound (U) contained 5,760, both being taken in vacuo, and it is believed that the result was accurate to a very small fraction of a grain, thanks to the great labours of Professor Miller. In reverting to the Commercial Pound, that would be 7,000 grains of which U weighed 5,760, both taken in air, and then, as the density of the new commercial Pound was very close to that of U, all sensible uncertainty arising from the destruction of U and the impossibility of knowing its exact density would vanish.

Professor Miller found the Platinum Pound P S. to be 7000·00093 grains of U both weighed in vacuo, and by Act of Parliament, *this* was declared to be the true standard of weight, and that one grain should be a seven-thousandth part of it. The Commercial Pound W was an imaginary Pound, supposed to be made of brass of a density of 8·15034, which was what Professor Miller estimated as the density of the lost Pound U. Though the standard in vacuo was changed, as above, by a minute quantity, it would have been wrong to change the weight of W in air. In order then that its weight in vacuo should become that of the Pound P S., it became necessary to suppose that this weight in vacuo†, and consequently its density, were changed, and to ascribe to it a new density of 8·1430.

The present definition of the English Commercial Pound then is—

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* I have followed the wording of my predecessors, but I should prefer to call the "*weight in vacuo*" the "*Mass,*" and restrict the term "*weight*" to the apparent force exercised. If this distinction were made, the questions involved would be much clearer. The Parliamentary Standard has been treated as one of *Mass;* hence two of the gilt secondary standards, each of the same Mass as P. S., will not have ordinarily the same *weight*, unless they have the same specific gravity.

† The weight in vacuo was 7000 grains of U, and in consequence of the Act of Parliament it became necessary that it should be the same as that of P S. or 7000·00093 grains of U.

The weight in standard air of a piece of brass whose weight in vacuo is the same as that of P S., and whose density, compared with that of water at its maximum density (the brass being at the freezing point), is 8·1430.

If we know the value of a weight in terms of P S , we shall be able to find its value in terms of W by adding the weight of air displaced by the same weight of brass similar to that of which W is supposed to be made, and deducting that actually displaced by the weight to be determined.

The Standard Platinum-Iridium ounce sent me is certified to weigh (in vacuo) 479·95979 grains in terms of P S., and the density has been assumed as 21·414, which is that of the 100 gramme weight. In English Standard Air its weight is given as 480·00502 grains, but that datum is useless for purposes of reference. It is called E I in the books of the Standards Office in London, and I propose to retain this name.

The ounce weight of the bullion set was certified to weigh 480·00145 grains in vacuo in terms of P S. and 480·00203 grains in English Standard Air in terms of W.

The following matter must be borne in mind in order that the procedure in my weighments may be understood :

The sign = means that the weights on each side of it are equal in vacuo.

The sign ≡ means that these are equal in air at the time ; and, in the case of Commercial Weights, that they are sufficiently equal for practical purposes at all times.

The sign ≙ means that the weights on each side being in the respective pans of the balance there would be equilibrium. When no division of the scale is mentioned as the resting point, it is assumed to be 10 for Oertling No. 1 and 15 for Oertling No. 2.

O_n is one of the set of Gilt Bullion Weights—the subscript number denotes its nominal value in Troy ounces.

P_n is one of a set of grain weights which have been used for small quantities, and *n* is the number of grains nominally : all weights not less than 1 grain are of platinum and have been cleaned by incandescence in a spirit-lamp. The tenths of grains are of aluminum and the hundreths of uncertain material.

R_1 and R_2 are two riders (approxinately of one-tenth of a grain each) used with the balance Oertling No. 1.

The Tables I have used in my reductions have been calculated by myself to the units of the Barometer and Thermometer scales commonly used in England, and which it was most easy for me to refer to. That for the density of air, has been calculated from the formula given by Professor Miller, in his paper in the Philosophical Transactions, with the necessary changes for units, and for the position of Her Majesty's Mint at Calcutta. The density of water has been calculated from a formula similar to Professor Miller's; but with the constants deduced from the new Tables of the British Standards Office. The other Tables, for the expansion of metals, are deduced from the same data as those of Professor Miller, but the form makes them more compact and convenient without any loss of accuracy. All will be found at the end.

SECTION II.—*The Balances.*

Oertling No. 1 is a chemical balance by Oertling with a beam 365 m. m. (14·56 inches) between the extreme knife edges. The principal knife edge is 28 m. m. (1·1 inches) long and the smaller ones 16·5 m. m. or 0·65 inches; all are of agate resting on agate planes. The beam is divided for the use of riders, and I have satisfied myself that the divisions are sufficiently accurate for this purpose. The scale is placed on the lower part of the pillar, and is read by a long index attached to the centre of the beam: this is in my opinion, the best arrangement.

Oertling No. 2 is a balance whose beam carries knife edges 404 m. m (15·9 inches) apart. The central knife edge is 38·4 m. m ($1\frac{1}{2}$ inches) long and those at the ends, 22 m. m or 0·87 inches. They are all of agate and rest on agate planes. The beam is very strong, and divided with sufficient accuracy for the use of a rider. There is an index of soft iron at each end of the beam to read an ivory scale. The left scale had very fine graduations and appeared to me useless. I have substituted a better one and removed the right scale.

SECTION III.—*Density of O Set of Weights.*

In order to compare O_1 with EI it is necessary to have a density of O_1: I have determined that of O_3 and assumed it to be the same as that of O_1 and of the other O weights.

It appears from the papers received from the Standards Office that $O_3 \equiv 3$ Troy ounces $\equiv$ 1440 grains with sufficient accuracy for this purpose, its exact value will be seen later.

On July 4th 1879, the balance Oertling No. 1 having been prepared for taking specific gravities, and a platinum hook, intended to support O_3 in water, having been hung by a fine wire of platinum so as to be immersed in distilled water; O_3 was placed in the pan in air, and counterbalanced with weights. O_3 being then placed in the hook, and all air bubbles carefully removed, it was found that; X being about 1490·2 grains:

$X \triangleq O_3$ in water (temp. $= 84°.\ 1$) + hook &c. in water + $(O_{\cdot 3} + O_{\cdot 04} + O_{\cdot 005} + O_{\cdot 004})$ in air $+ 4.\ \frac{R_2}{10}$ at 10·02 divisions of the scale—

then, removing O_3 from water, carefully drying it, and placing it in the pan, I found after adding 180 minims of water

$$X \mathrel{\hat{=}} O_3 \text{ in air} + \text{hook \&c. in water} + 2{\cdot}72\,\frac{R_2}{10} \text{ at } 10{\cdot}02 \text{ divisions.}$$

Hence the loss of weight apparently $= O_{\cdot 3} + O_{\cdot 04} + O_{\cdot 005} + O_{\cdot 004} + 1{\cdot}28\,\frac{R_2}{10}$.

My approximate calculations gave me the sum of the above four weights as 167·5400 grains, and the value of the rider is approximately $\frac{1}{10}$th of a grain, the difference from the true value being negligible. Hence the loss of weight between air and water was 167·5528 grains, and, though I did not observe the Barometer, it may be considered as 29·46, and the temperature 87°·5; this gives $\Delta\, O_3 = 8{\cdot}5649$.

Again on July 7th, I found in the same way.

$$\left.\begin{array}{l} (A)\; X + 5\,\frac{R_1}{10} \mathrel{\hat{=}} O_3 \text{ in water} + \text{hook \&c. in water} \\ \qquad\qquad + 167{\cdot}54 \text{ grains} + 3\,\frac{R_2}{10} \text{ at } 13{\cdot}30 \text{ Div.} \\ (B)\; X + 5\,\frac{R_1}{10} \mathrel{\hat{=}} O_3 \text{ in water} + \text{hook \&c in water} \\ \qquad\qquad + 167{\cdot}54 \text{ grains} + 6\,\frac{R_2}{10} \text{ at } 4{\cdot}72 \text{ Div.} \end{array}\right\} \begin{array}{c} \text{Temp.} \\ \text{water } 84{\cdot}25 \text{ F.} \end{array}$$

and, after adding 169 minims of water.

$$(C)\; X + 5\,\frac{R_1}{10} \mathrel{\hat{=}} O_3 \text{ in air} + \text{hook \&c. in water} + 7\,\frac{R_2}{10} \text{ at } 14{\cdot}80 \text{ Div.}$$

Bar. 29°·445.

$$(D)\; X + 5\,\frac{R_1}{10} \mathrel{\hat{=}} O_3 \text{ in air} + \text{hook \&c. in water} + 9\,\frac{R_2}{10} \text{ at } 8{\cdot}35 \text{ Div.}$$

Temp. 85°·7 F.

Hence by interpolating between (A) and (B)

$$\left.\begin{array}{l} X + 5\,\frac{R_1}{10} \mathrel{\hat{=}} O_3 \text{ in water} + \text{hook \&c. in water} \\ \qquad\qquad + 167{\cdot}54 \text{ grs.} + 4{\cdot}14\,\frac{R_2}{10} \\ \text{and from (C) and (D)} \\ X + 5\,\frac{R_1}{10} \mathrel{\hat{=}} O_3 + \text{hook \&c. in water} + 8{\cdot}49\,\frac{R_2}{10} \end{array}\right\} \begin{array}{ll} \text{Temperatures} & \\ \text{Water} & 84^\circ{\cdot}25\text{F.} \\ \text{Air} & 85{\cdot}7 \\ & \text{in.} \\ \text{Bar.} & 29{\cdot}445 \end{array}$$

Thus the loss of weight was apparently 167·4965 grains, and $\Delta\, O_3 = 8{\cdot}5676$. Giving this last result triple weight, on account of better observing, we have as a mean; $\Delta\, O_3 = 8{\cdot}5669$: which may be considered the density for all the weights of this set; and which will not be altered by the true values of the weights used, being substituted for the approximate ones.

SECTION IV.—*System of Weighments.*

I have adopted a uniform system of weighment for comparing the weights. Some years ago I made a considerable number of experiments on the species of errors which occurred in practice, and the present system is the outcome: there have been minute deviations, but in all material points the procedure has been uniformly followed, and I think it has been successful in eliminating all progressive errors. The principal of these is the tendency of the arms of the balance to expand unequally with temperature, but there are others which have occasionally been found. I annex specimens of the form I have used in work.

The weights to be compared being placed in the pans, a preponderance is given to one side of the balance; so as to make the resting point, when the whole is in equilibrium, lie on one side of the centre point; yet so slightly, that the weight used to get the value of the scale, shall deflect the resting point to the other side. In the first example with Oertling No. 1, it will be seen, that with EI in the left pan and O_1 in the right, the Right Rider was placed at 1·2 of the beam scale; in this state the index had its resting point at 7·54 divisions (10 being the middle). Then the weight $P_{\cdot 01}$ was added to the left side and the resting point became 15·81 Div. Each resting point is deduced from 4 readings, two low l_1 and l_2, and two high h_1 and h_2. The beam having been carefully released, the first excursion outwards, and the return towards the scale centre, are neglected; and the next four readings of the extremes of oscillation taken. The first reading will thus usually be low, if the resting point be low; and high, if that be high: but, when signs of irregularity occur, this may not be the case, as I have always, in such cases, freely omitted readings till the oscillations have become regular. Then, supposing a low reading first, $\frac{l_1 + 2h_1 + l_2}{4}$ and $\frac{h_1 + 2l_2 + h_2}{4}$ would be readings of the resting points, and the sums in the numerators have been rapidly formed separately during the work, added, and divided by 8. This has been afterwards checked by $\frac{l_1 + h_2 + 3\,(l_2 + h_1)}{8}$: of course, when h comes first, the h's take the place of the l's in these formulæ, and *vice versâ.*

We thus have two "*partial weighments*"

$$\text{EI} \bumpeq O_1 + 1{\cdot}2\,\frac{R_2}{10} \text{ at } 7{\cdot}54 \text{ divisions and}$$

$$\text{EI} + P_{\cdot 01} \bumpeq O_1 + 1{\cdot}2\,\frac{R_2}{10} \text{ at } 15{\cdot}81 \text{ divisions}$$

from which I get, by interpolation, as a result of the "*weighment*"

$$EI \triangleq O_1 + 1{\cdot}2\,\frac{R_2}{10} - P_{\cdot 01}\cdot\frac{2{\cdot}46}{8{\cdot}27} \text{ or } O_1 + 1{\cdot}2\,\frac{R_2}{10} - 0{\cdot}297\,P_{\cdot 01}$$

The second weighment is made after the weights are interchanged in the pans and the result deduced the same way. These together make one "*comparison;*" and then a second comparison is made, every operation being followed, but precisely in the reverse order, to make a "*complete comparison.*" The result of the four equations when summed is

$$4\,EI \equiv 4\,O_1 + 0{\cdot}191\,P_{\cdot 01} \text{ or}$$
$$EI \equiv O_1 + 0{\cdot}04775\,P_{\cdot 01}$$

The interpolations are made with sufficient accuracy with a slide rule.

In all the comparisons of the O set and P set, except those of EI with O_1, which were made with the balance Oertling No. 1, I have used one of the riders (the right) to add a constant weight to one side and the other in variable positions. Assuming that the rider can be accurately placed on the divisions, and that these are sufficiently accurate, it seems to me that I may safely use the rider in this way, and that the error of determination of the weight of the rider will thus be of less importance than that of a small weight.

In the case of the very small weights I have added the weight P_{24} to one pan, and P^{*}_{24} to the other, in order to steady them, with great advantage.

SECTION V.—*Determination of O_1, in terms of the English Commercial Pound*

I have before mentioned that I have received as a Standard a Troy ounce of Platinum-Iridium, whose weight in terms of the Parliamentary Standard Pound P S. is 479·95979 grains of P S.; and I have explained the relations between the English Standard Pound and the commercial Pound. In order that I may determine the errors of the Bullion set of Weights, it is necessary that I should determine O_1 in terms of the English Commercial Pound: I have it is true the determination made in London, but it is necessary to verify this, not only to make the standard of weight now, identical with that I should get again, but also because the gilt weights may have slightly changed in the long voyage.

The Barometer I have used is an Aneroid Barometer by Browning, which I have found give corrected Barometer readings without sensible error. I have, except in the first comparison, used two Thermometers which were examined for me some years ago at Kew, and whose zero point I have recently re-determined: these were suspended in the balance case of Oertling No. 1, so as to hang about half way between the pillar carrying the central plane, and the suspensions of the scale pans. The Humidity has been deduced from a new Masons Hygrometer: I have not the errors of its Thermometers, but they are modern, and not likely to have any producing sensible corrections to my result.

The following is a specimen of computation for the comparison of EI and O_1 which is entered in the type form; in it, v EI = volume of water at its greatest density which is displaced by EI at 32°. F.

$$\text{it therefore} = \frac{wt.\ \text{EI}}{\Delta\text{EI}} = \frac{479{\cdot}95979}{21{\cdot}414} = [1{\cdot}35051]$$

$$\text{similarly } v\ O_1 = \frac{479{\cdot}99760}{8{\cdot}5669} = [1{\cdot}74842]$$

May 24th, 1879 A. M.

Commenced at 6 h. 48 m.	Ended at 7 h. 33 m.
Dry Bulb $85\overset{\circ}{\cdot}9$ F.	Dry Bulb $85\overset{\circ}{\cdot}4$
Wet do. 81·0 } Vapour Tension	Wet do. 80·1 } Vapour Tension
Diff. 4·9 } 0·993 in.	5·3 } 0·960 in.
Mean of Thermometers $\overset{\circ}{85{\cdot}5}$	Mean Red. Barometer $\overset{\text{in.}}{29{\cdot}605}$
Correction 0·00	0·189(0·993 + 0·960) = 0·369
Mean Temperature 85·50	h. = 29·236 log — 1·46592
	log A_t (Tab I.) 5·59005
7·05597	.... 7·05597
log v EI ...... 1·35051	log v O_1 ... 1·74842
(Tab. III.) log (1 + E P_t) 0·00035	(Tab. III.) log (1 + E B_t) ... 0·00066
Air displaced by EI = 0·025517 grs. } log = 8·40683	Air displaced by O_1 = 0·063834 grs. } log = 8·80505

	grains.
Weight EI in Vacuo =	479·95979 of P S.
Air displaced =	— 0·025517
EI ≡	479·934273
Air displaced by O_1 = +	0·063834
O_1 ≡ EI —	0·000475*
O_1 =	479·997632

---

* In section IV, I found EI = O_1 + 0·4775 $P_{\cdot 91}$ and (Sec. VI) $P_{\cdot 91}$ = 0·009947 grains.

Abstract of Comparisons.

1879 May 24,	O_1 =	479·997632	P S. grain.
„ 28,	„	·997489	„
„ 30,	„	·996732	„
„ 31,	„	·997266	„
„ June 1,	„	·996911	„

Mean O_1 = 479·997206 ± 0·000115 P S. grains.

I have received, from the Meteorological Reporter to the Government of Bengal, the following mean data for Calcutta which I take as the definition of Standard Air

Reduced Barometer,... 29·787 in.
Temperature,............ 79°·0 F.
Humidity,................ 0·76 per cent.
whence $\Delta A_s = 7.06510$.

Hence I have weight of O_1 = 479·997206 grains of P S.
Deduct displaced Standard Air = — 0·065178
Add Standard Air for $\frac{480}{7000}$ W = + 0·068571

O_1 ≡ 480·000599 grains of English Commercial Pound.

This value differs slightly from that sent me and which I have quoted before.

SECTION VI.—*On the determination of the errors of single weights.*

In the interval between O_1 and O_{10} there are, in all English bullion sets, weights O_5, O_4, O_3, and O_2; so between O_{10} and O_{100} come O_{20} O_{30} O_{40} and O_{50}, and so on.

Between these weights we may make comparisons giving the following equations :

$$
\begin{aligned}
O_{10} &\equiv O_5 + O_4 + O_1 + x_1 \pm e \ (a)\\
&\equiv O_5 + O_3 + O_2 + x'_1 \pm e \ (b)\\
&\equiv O_4 + O_3 + O_2 + O_1 + x''_1 \pm e \ (c)\\
O_5 &\equiv O_4 + O_1 + x_2 \pm e\\
O_5 &\equiv O_3 + O_2 + x_3 \pm e\\
O_4 &= O_3 + O_1 + x_4 \pm e\\
O_3 &= O_2 + O_1 + x_5 \pm e
\end{aligned}
$$

e being the *p. e.* of one comparison.

Hence we have
$$
\begin{aligned}
O_2 &\equiv 2\,O_1 + x_4 - x_3 + x_2 \pm e\sqrt{3}\\
O_3 &\equiv 3\,O_1 + x_5 + x_4 - x_3 + x_2 \pm e\sqrt{4}\\
O_4 &\equiv 4\,O_1 + x_5 + 2x_4 - x_3 + x_2 \pm e\sqrt{7}\\
O_5 &\equiv 5\,O_1 + x_5 + 2x_4 - x_3 + 2x_2 \pm e\sqrt{10}
\end{aligned}
$$

$$O_{10}\begin{cases}\equiv 10\,O_1 + 2x_5 + 4x_4 - 2x_3 + 3x_2 + x_1 \pm e\sqrt{34} \text{ from } (a)\\ \equiv 10\,O_1 + 2x_5 + 4x_4 - 3x_3 + 4x_2 + x_1' \pm e\sqrt{46} \text{ from } (b)\\ \equiv 10\,O_1 + 2x_5 + 4x_4 - 3x_3 + 3x_2 + x_1'' \pm e\sqrt{39} \text{ from } (c)\end{cases}$$

which equations give the ascending series; and it is important to note, that if the probable error of the observations be alike, there is a disadvantage in using any comparison but (a), and that even if (b) and (c) be observed as checks, they should not be used in computing, as they will lower the weight of O_{10}, on the accuracy of which we are dependent for continuing the upward series; thus the mean value of O_{10} from (a) and (c) will be

$$O_{10} \equiv 10\,O_1 + \tfrac{1}{2}\,(4x_5 + 4x_4 - 5x_3 + 6x_2 + x_1 + x_1'') \pm e\sqrt{\tfrac{73}{4}}$$

and if the series (b) had been involved the loss of probable accuracy would have been greater.

Next as to descending or decreasing series from W_{10}.

1st. Descending through (a)

$$O_5 \equiv \tfrac{5}{10}\,O_{10} + \frac{x_2 - x_1}{2} \pm e\sqrt{\tfrac{50}{10}}$$

$$O_4 \equiv \tfrac{4}{10}\,O_{10} + \tfrac{1}{10}\,(2x_5 + 4x_4 - 2x_3 - 2x_2 - 4x_1) \pm e\sqrt{\tfrac{44}{10}}$$

$$O_3 \equiv \tfrac{3}{10}\,O_{10} + \tfrac{1}{10}\,(4x_5 - 2x_4 - 4x_3 + x_2 - 3x_1) \pm e\sqrt{\tfrac{46}{10}}$$

$$O_2 \equiv \tfrac{2}{10}\,O_{10} - \tfrac{1}{10}\,(4x_5 - 2x_4 + 6x_3 - 4x_2 + 2x_1) \pm e\sqrt{\tfrac{76}{10}}$$

$$O_1 \equiv \tfrac{1}{10}\,O_{10} - \tfrac{1}{10}\,(2x_5 + 4x_4 - 2x_3 + 3x_2 + x_1) \pm e\sqrt{\tfrac{34}{10}}.$$

Again descending through (b)

$$O_5 \equiv \tfrac{5}{10}\,O_{10} + \tfrac{1}{2}\,(x_3 - x_1') \pm e\sqrt{\tfrac{50}{10}}$$

$$O_4 \equiv \tfrac{4}{10}\,O_{10} + \tfrac{1}{10}\,(2x_5 + 4x_4 + 2x_3 - 6x_2 - 4x_1') \pm e\sqrt{\tfrac{76}{10}}$$

$$O_3 \equiv \tfrac{3}{10}\,O_{10} + \tfrac{1}{10}\,(4x_5 - 2x_4 - x_3 - 2x_2 - 3x_1') \pm e\sqrt{\tfrac{34}{10}}$$

$$O_2 \equiv \tfrac{2}{10}\,O_{10} - \tfrac{1}{10}\,(4x_5 - 2x_4 + 4x_3 - 2x_2 + 2x_1') \pm e\sqrt{\tfrac{38}{10}}$$

$$O_1 \equiv \tfrac{1}{10}\,O_{10} - \tfrac{1}{10}\,(2x_5 + 4x_4 - 3x_3 + 4x_2 + x_1') \pm e\sqrt{\tfrac{46}{10}}.$$

Also descending through (c)

$$O_5 \equiv \tfrac{5}{10}\,O_{10} + \frac{x_3 + x_2 - x_1''}{2} \pm e\sqrt{\tfrac{75}{10}}$$

$$O_4 \equiv \tfrac{4}{10}\,O_{10} + \tfrac{1}{10}\,(2x_5 + 4x_4 + 2x_3 - 2x_2 - 4x_1'') \pm e\sqrt{\tfrac{32}{10}}$$

$$O_3 \equiv \tfrac{3}{10}\,O_{10} + \tfrac{1}{10}\,(4x_5 - 2x_4 - x_3 + x_2 - 3x_1'') \pm e\sqrt{\tfrac{23}{10}}$$

$$O_2 \equiv \tfrac{2}{10}\,O_{10} - \tfrac{1}{10}\,(4x_5 - 2x_4 + 4x_3 - 4x_2 + 2x_1'') \pm e\sqrt{\tfrac{56}{10}}$$

$$O_1 \equiv \tfrac{1}{10}\,O_{10} - \tfrac{1}{10}\,(2x_5 + 4x_4 - 3x_3 + 3x_2 + x_1'') \pm e\sqrt{\tfrac{39}{10}}.$$

If we were to be guided here by the same consideration as before, we should absolutely prefer the use of series (a) alone, but it is easy to see, that as the probable error of O_1 involves only $\tfrac{1}{10}$ of that of O_{10}; the determination of its weight will be almost entirely dependent on the error generated in the comparisons of the group* of the series, and not on that derived from the starting weight: this renders the choice less important.

As a matter of fact I have worked both through (*a*) and (*b*) taking the mean result and in this case.

$$O_5 \equiv \tfrac{5}{10} O_{10} + \tfrac{1}{4} (x_3 + x_2 + x_1 + x_1') \pm e \sqrt{\tfrac{25}{10}}$$
$$O_4 \equiv \tfrac{4}{10} O_{10} + \tfrac{1}{20} (4x_5 + 8x_4 - 8x_2 - 4x_1 - 4x_1') \pm e \sqrt{\tfrac{44}{10}}$$
$$O_3 \equiv \tfrac{3}{10} O_{10} + \tfrac{1}{20} (8x_5 - 4x_4 - 5x_3 - x_2 - 3x_1 - 3x_1') \pm e \sqrt{\tfrac{31}{10}}$$
$$O_2 \equiv \tfrac{2}{10} O_{10} - \tfrac{1}{20} (8x_5 - 4x_4 + 10x_3 - 6x_2 + 2x_1 + 2x_1') \pm e \sqrt{\tfrac{52}{10}}$$
$$O_1 \equiv \tfrac{1}{10} O_{10} - \tfrac{1}{20} (4x_5 + 8x_4 - 5x_3 + 7x_2 + x_1 + x_1') \pm e \sqrt{\tfrac{39}{10}}.$$

My choice was a matter of accident, but it turns out that the sum of the squares of the probable errors of all the deduced weights is less than for any one of the single series.

The other system of weights, which I have in this paper slightly to deal with, is what I shall call the "*English grain system.*" In it the weights interpolated between 10 and 1 are 6, 3 and 2. Thus starting from either end of the decad there are four weights to be derived; but among these weights alone, only three equations can be obtained.

$$\begin{aligned} P_{10} &= P_6 + P_3 + P_1 + x_1 \\ P_6 &= P_3 + P_2 + P_1 + x_2 \\ P_3 &= P_2 + P_1 \qquad + x_3. \end{aligned}$$

To make a definite resect the best plan is to use a second P_1 called P_1': $P_{\cdot 1} + P_{\cdot 5} + P_{\cdot 1}$ from the next lower decad height be used but the equations would not be independent for the separate decads.

$$P_2 = P_1 + P_1' + x_4 \text{ and } P_1 = P_1' + x_5$$

and we now have 5 equations to determine 5 quantities, and the result is definite. Of course by substituting P'_1 for P_1, we can get 3 more equations like the first three, but the labour would be increased, and the result would still be definite, though slightly more accurate, especially as regards the spare weight P_1'.

From the equations we have; *in ascending (increasing weights)*

$$\begin{aligned} P_1' &= P_1 - x_5 \pm e. \\ P_2 &= 2\,P_1 - x_5 + x_4 \pm e \sqrt{2} \\ P_3 &= 3\,P_1 - x_5 + x_4 + x_3 \pm e \sqrt{3} \end{aligned}$$

---

* I use the term *decad* to include the weights from 0·1 to 1, or from 1 to 10, &c., the last being ten times the first; and a *group* of equations consists of those connecting the weights of a *decad.*

$$P_6 = 6\,P_1 - 2x_5 + 2x_4 + x_3 + x_2 \pm e'\sqrt{10}$$

$$P_{10} = 10\,P_1 - 3x_5 + 3x_4 + 2x_3 + x_2 + x_1 \pm e\sqrt{24.}$$

While *descending*, we have

$$P_6 = \tfrac{6}{10}\,P_{10} - \tfrac{1}{10}\,(2x_5 - 2x_4 + 2x_3 - 4x_2 + 6x_1) \pm e\sqrt{\tfrac{54}{10}}$$

$$P_3 = \tfrac{3}{10}\,P_{10} - \tfrac{1}{10}\,(x_5 - x_4 - 4x_3 + 3x_2 + 3x_1) \pm e\sqrt{\tfrac{36}{10}}$$

$$P_2 = \tfrac{2}{10}\,P_{10} - \tfrac{1}{10}\,(4x_5 - 4x_4 + 4x_3 + 2x_2 + 2x_1) \pm e\sqrt{\tfrac{56}{10}}$$

$$P_1 = \tfrac{1}{10}\,P_{10} + \tfrac{1}{10}\,(3x_5 - 3x_4 - 2x_3 - x_2 - x_1) \pm e\sqrt{\tfrac{24}{10}}$$

$$P_1' = \tfrac{1}{10}\,P_{10} - \tfrac{1}{10}\,(7x_5 + 3x_4 + 2x_3 + x_2 + x_1) \pm e\sqrt{\tfrac{64}{10}.}$$

SECTION VII.

I now proceed to the determination of the actual values of the weights below O_1, and of the P set, in commercial grains. The equations have all been determined in terms of the rider R_1, in the balance Oertling No. 1, and they are given in this way. Of course the whole of the computations were made with this unknown factor, but it has been determined (see page 56) and the value has been substituted in the results to save repetition. The differences between the two determinations of the constant term in each equation are given, and from them is derived a probable error of one equation. I had intended that the observations in each decad should be separately valued, but when that is done the results are so nearly alike that it seems unnecessary to adhere to this. The mode of determining the probable error of each weight is the subject of the next section, but the values are given in this.

Value of Weights of W set below W_1 with Balance Oertling No. 1.

I have here the following equations :

$O_1 \equiv O_{\cdot5} + O_{\cdot4} + O_{\cdot1} - 0{\cdot}213325\,R_1$ Difference = 2600
$O_1 \equiv O_{\cdot5} + O_{\cdot3} + O_{\cdot2} - 0{\cdot}238825$,, ,, = 1450
$O_{\cdot5} \equiv O_{\cdot4} + O_{\cdot1} - 0{\cdot}001800$,, ,, = 350
$O_{\cdot5} \equiv O_{\cdot3} + O_{\cdot2} - 0{\cdot}124325$,, ,, = 500
$O_{\cdot4} \equiv O_{\cdot3} + O_{\cdot1} - 0{\cdot}002913$,, ,, = 825
$O_{\cdot3} \equiv O_{\cdot2} + O_{\cdot1} - 0{\cdot}011113$,, ,, = 275

$O_{\cdot1} \equiv O_{\cdot05} + O_{\cdot04} + O_{\cdot01} - 0{\cdot}033200\,R_1$ Difference = 200
$O_{\cdot1} \equiv O_{\cdot05} + O_{\cdot03} + O_{\cdot02} - 0{\cdot}042213$,, ,, = 2925
$O_{\cdot05} \equiv O_{\cdot04} + O_{\cdot01} - 0{\cdot}020938$,, ,, = 475
$O_{\cdot05} \equiv O_{\cdot03} + O_{\cdot02} - 0{\cdot}032138$,, ,, = 1475
$O_{\cdot04} \equiv O_{\cdot03} + O_{\cdot01} - 0{\cdot}030838$,, ,, = 775
$O_{\cdot03} \equiv O_{\cdot02} + O_{\cdot01} - 0{\cdot}035763$,, ,, = 475

$O_{\cdot 01}$ ≡ $O_{\cdot 005}$ + $O^{*}_{\cdot 004}$ + $O_{\cdot 001}$ — 0·012263 R_1 Difference = 425
$O_{\cdot 01}$ ≡ $O_{\cdot 005}$ + $O_{\cdot 003}$ + $O_{\cdot 002}$ — 0·021500 „ „ = 150
$O_{\cdot 005}$ ≡ $O_{\cdot 004}$ + $O_{\cdot 001}$ — 0·076963 „ „ = 1625
$O_{\cdot 005}$ ≡ $O_{\cdot 003}$ + $O_{\cdot 002}$ — 0·015813 „ „ = 1725
$O_{\cdot 004}$ ≡ $O_{\cdot 003}$ + $O_{\cdot 001}$ — 0·040638 „ „ = 675
$O_{\cdot 003}$ ≡ $O_{\cdot 002}$ + $O_{\cdot 001}$ — 0·093775 „ „ = 100
$O_{\cdot 025}$ ≡ $O_{\cdot 02}$ + $O_{\cdot 005}$ — 0.016100 R_1 Difference = 200

From these equations I deduce

grs. grs.
$O_{\cdot 5}$ ≡ 240·000300 + 0·056006 R_1 ≡ 240·005927 *p. e.* = 0·000064
$O_{\cdot 4}$ ≡ 192·000240 + 0·127762 „ ≡ 192·013076 „ 0·000060
$O_{\cdot 3}$ ≡ 144·000180 + 0·100631 „ ≡ 144·010290 „ 0·000047
$O_{\cdot 2}$ ≡ 96·000120 + 0·081700 „ ≡ 96·008328 „ 0·000048
$O_{\cdot 1}$ ≡ 48·000060 + 0·030044 „ ≡ 48·003078 „ 0·000037
$O_{\cdot 05}$ ≡ 24·000030 + 0·020606 „ ≡ 24·002100 „ 0·000033
$O_{\cdot 04}$ ≡ 19·200024 + 0·015988 „ ≡ 19·201630 „ 0·000040
$O_{\cdot 03}$ ≡ 14·400018 + 0·021269 „ ≡ 14·402155 „ 0·000033
$O_{\cdot 02}$ ≡ 9·600012 + 0·031475 „ ≡ 9·603180 „ 0·000012
$O_{\cdot 01}$ ≡ 4·800006 + 0·025537 „ ≡ 4·802574 „ 0·000035
$O_{\cdot 005}$ ≡ 2·400003 + 0·030932 „ ≡ 2·403111 „ 0·000033
$O_{\cdot 004}$ ≡ 1·920002 + 0·065261 „ ≡ 1·926559 „ 0·000040
$O_{\cdot 003}$ ≡ 1·440002 — 0·018011 „ ≡ 1·438193 „ 0·000033
$O_{\cdot 002}$ ≡ 0·960001 + 0·033130 „ ≡ 0·963329 „ 0·000042
$O_{\cdot 001}$ ≡ 0·480001 + 0·042634 „ ≡ 0·484284 „ 0·000035
$O_{\cdot 025}$ ≡ 12·000015 + 0·036101 „ ≡ 12·003642 „ 0·000077

The two largest weights P_{24} and P^{*}_{24} of the P set are each approximately equal to 24 grains and their sum is of course nearly = $O_{\cdot 1}$ but they are of platinum while $O_{\cdot 1}$ is of gilt bronze. Small as these are the errors cannot be neglected when accuracy is required. The purpose of the determination being mainly to get the values of the small weights of the P set with accuracy so that they may be used to determine differences, it is enough to correct the value above given of $O_{\cdot 1}$ so that the deduced value of $P_{\cdot 24}$ + P^{*}_{24} may be the same as if the comparison had been made in standard air. For all ordinary purposes the resulting values of these weights may be used without correction.

I have found that 48 grains of platinum would weigh less in my standard air than under the circumstances of the observation by 0.000063 grains. Also O_1 ≡ P_{24} + P^{*}_{24} + 0·050238 R_1.

grs.
The value of $O_{\cdot 1}$ is ≡ 48·000060 + 0·030044 R_1
∴ in actual air P_{24} + P^{*}_{24} ≡ 48·000060 — 0·020194 R_1
and the correction to standard air is — 0·000063
Hence in standard air P_{24} + P^{*}_{24} ≡ 47·999997 — 0·020194 R_1

I shall for convenience write M for 47·999997 grains and place the equations so far as they are necessary to determine the weights down to P_1 in a form suitable for use thus—

$$\begin{array}{lr@{\ }l}
 & & \text{Diff.} \\
P_{24} + P^*_{24} & - M + 0{\cdot}020194\,R_1 & \equiv 0{\cdot}275\ R_1 \\
P_{24} - P^*_{24} & - 0{\cdot}006438\ \text{,,} & \equiv 0{\cdot}475\ \text{,,} \\
P_{24} - P_{16} - P_6 - P_2 & - 0{\cdot}012913\ \text{,,} & \equiv 0{\cdot}1125\ \text{,,} \\
P^*_{24} - P_{20} - P_3 - P_1 & + 0{\cdot}000125\ \text{,,} & \equiv 0.650\ \text{,,} \\
P_{20} - P_{16} - P_3 - P_1 & + 0{\cdot}010138\ \text{,,} & \equiv 0{\cdot}900\ \text{,,} \\
P_{20} - P_{10} - P_6 - P_3 - P_1 & - 0{\cdot}008500\ \text{,,} & \equiv 0{\cdot}25\ \text{,,} \\
P_{16} - P_{10} - P_6 & - 0.018400\ \text{,,} & \equiv 0{\cdot}1700\ \text{,,} \\
P_{10} - P_6 - P_3 - P_1 & - 0{\cdot}004813\ \text{,,} & \equiv 0{\cdot}775\ \text{,,} \\
P_6 - P_3 - P_2 - P_1 & + 0{\cdot}018908\ \text{,,} & \equiv 0{\cdot}375\ \text{,,} \\
P_3 - P_2 - P_1 & + 0{\cdot}015463\ \text{,,} & \equiv 0{\cdot}1075\ \text{,,} \\
P_2 - P_1 - P'_1 & + 0{\cdot}009388\ \text{,,} & \equiv 0{\cdot}1175\ \text{,,} \\
P_1 - P'_1 & - 0{\cdot}005838\ \text{,,} & \equiv 0{\cdot}1275\ \text{,,}
\end{array}$$

I have tried various ways of dealing with these equations but, when the probable errors are wanted, the method of least squares is the easiest. I thus get—

$$\begin{array}{lllll}
 & \text{grs.} & \text{grs.} & & \\
P_{24} & \equiv 23{\cdot}999999 - 0{\cdot}006997\,R_1 & \equiv 23{\cdot}999296 & p.\,e. = & 0{\cdot}000042 \\
P^*_{24} & \equiv 23{\cdot}999999 - 0{\cdot}003185\ \text{,,} & \equiv 23{\cdot}998679 & \text{,,} & 0{\cdot}000042 \\
P_{20} & \equiv 19{\cdot}999999 - 0{\cdot}014515\ \text{,,} & \equiv 19{\cdot}998541 & \text{,,} & 0{\cdot}000050 \\
P_{16} & \equiv 15{\cdot}999999 - 0{\cdot}006007\ \text{,,} & \equiv 15{\cdot}999396 & \text{,,} & 0{\cdot}000049 \\
P_{10} & \equiv 9{\cdot}999999 - 0{\cdot}009026\ \text{,,} & \equiv 9{\cdot}999092 & \text{,,} & 0{\cdot}000043 \\
P_6 & \equiv 6{\cdot}000000 - 0{\cdot}015531\ \text{,,} & \equiv 5{\cdot}998440 & \text{,,} & 0{\cdot}000013 \\
P_3 & \equiv 3{\cdot}000000 - 0{\cdot}006360\ \text{,,} & \equiv 2{\cdot}999361 & \text{,,} & 0{\cdot}000035 \\
P_2 & \equiv 2{\cdot}000000 + 0{\cdot}001371\ \text{,,} & \equiv 2{\cdot}000137 & \text{,,} & 0{\cdot}000050 \\
P_1 & \equiv 1{\cdot}000000 + 0{\cdot}008077\ \text{,,} & \equiv 1{\cdot}000811 & \text{,,} & 0{\cdot}000039 \\
P'_1 & \equiv 1{\cdot}000000 + 0{\cdot}002461\ \text{,,} & \equiv 1{\cdot}000247 & \text{,,} & 0{\cdot}000043
\end{array}$$

$$\begin{array}{rlrlr}
\text{Further } P_1 & \equiv P_{\cdot6} + P_{\cdot3} + P_{\cdot1} & + 0{\cdot}000038\,R_1 & \text{Diff.} & 725\,R_1 \\
P_{\cdot6} & \equiv P_{\cdot3} + P_{\cdot2} + P_{\cdot1} & + 0{\cdot}005525\ \text{,,} & \text{,,} & 0\ \text{,,} \\
P_{\cdot3} & \equiv P_{\cdot2} + P_{\cdot1} & - 0{\cdot}004675\ \text{,,} & \text{,,} & 500\ \text{,,} \\
P_{\cdot2} & \equiv P_{\cdot1} + P'_{\cdot1} & + 0{\cdot}006963\ \text{,,} & \text{,,} & 1325\ \text{,,} \\
P_{\cdot1} & \equiv P'_{\cdot1} & + 0{\cdot}005813\ \text{,,} & \text{,,} & 525\ \text{,,}
\end{array}$$

$$\begin{array}{rllll}
 & & \text{grs.} & & \\
\text{Whence } P_{\cdot6} & \equiv 0{\cdot}600000 + 0{\cdot}002673\,R_1 & \equiv 0{\cdot}600269 & p.\,e. = & 0{\cdot}000056 \\
P_{\cdot3} & \equiv 0{\cdot}300000 + 0{\cdot}005647\ \text{,,} & \equiv 0{\cdot}300567 & \text{,,} & 0{\cdot}000035 \\
P_{\cdot2} & \equiv 0{\cdot}200000 + 0{\cdot}002832\ \text{,,} & \equiv 0{\cdot}200285 & \text{,,} & 0{\cdot}000042 \\
P_{\cdot1} & \equiv 0{\cdot}100000 + 0{\cdot}000842\ \text{,,} & \equiv 0{\cdot}100085 & \text{,,} & 0{\cdot}000028 \\
P'_{\cdot1} & \equiv 0{\cdot}100000 - 0{\cdot}001971\ \text{,,} & \equiv 0{\cdot}099501 & \text{,,} & 0{\cdot}000045
\end{array}$$

By weighing the riders against the nearly equal weight $P_{\cdot 1}$ I have

$R_1 \equiv P_{\cdot 1} + 0{\cdot}003813\, R_2$ Diff. 425
$R_2 \equiv P_{\cdot 1} + 0{\cdot}000375\, R_1$,, 600

Substituting successively for the value of R_1, of $P_{\cdot 1}$, and of R_2 we get

grs.
$R_1 \equiv 0.1003814 + 0{\cdot}000847\, R_1 \equiv 0{\cdot}100466$ grs. $p.\ e. = 0{\cdot}000062$
$R_2 \equiv 0{\cdot}100000 + 0{\cdot}001217\, R_1 \equiv 0{\cdot}100122$,, ,, $= 0{\cdot}000062$
Also—$P_{\cdot 1} \equiv P_{\cdot 06} + P_{\cdot 03} + 0{\cdot}089038\, R_2$ Diff. 825
$P_{\cdot 06} \equiv P_{\cdot 03} + P_{\cdot 02} + 0{\cdot}104750$,, ,, 1550
$P_{\cdot 03} \equiv P_{\cdot 02} + 0{\cdot}105075$,, ,, 900
$P_{\cdot 01} \equiv 0{\cdot}099438$,, ,, 137
Whence $P_{\cdot 06} \equiv \frac{2}{3} P_{\cdot 1} - 0{\cdot}059467\, R_2 \equiv 0{\cdot}060769$ $p.\ e. = 0{\cdot}000047$
$P_{\cdot 03} \equiv \frac{1}{3} P_{\cdot 1} - 0{\cdot}029571$,, $\equiv 0{\cdot}030400$,, $0{\cdot}000034$
$P_{\cdot 02} \equiv \frac{1}{3} P_{\cdot 1} - 0{\cdot}134646\, R_1 \equiv 0{\cdot}019881$,, $0{\cdot}000047$
$P_{\cdot 01} \equiv 0.099438$,, $\equiv 0{\cdot}009956$,, $0{\cdot}000056$

SECTION VIII.—*Determination of the probable errors of the values of the O and P sets.*

In Section VI, I have shown that if the probable error of the constant terms in the equations of a group be known, we can determine the probable errors of the determinations in the group, so far as they depend on it: and we have now to consider what may be taken as the probable error of one determination.

Each coefficient of R is derived in the preceding work from two determinations which rarely agree. The differences are noted in terms of the 6th decimal place of the coefficient. If we were certain that the true values of the constants lay between the determinations, then, calling the difference of the two $2a$, we should have $\frac{\Sigma\, a}{n}$ = the mean of errors and $p.\ e.$ of an equation $= e = 0{\cdot}8454 \frac{\Sigma\, a}{n}$; but this value is clearly too small; because, if the occurrence of positive and negative errors be equally probable, then there is an even chance that a fourth of the values of $2a$ will be the difference and not the sum of the two actual errors.

I prefer therefore to use the formula

mean of errors $= \dfrac{\Sigma\, v}{\sqrt{m\,(m-1)}}$: m being the number of complete comparisons

and probable error $= 0{\cdot}8454 \dfrac{\Sigma\, v}{\sqrt{m\,(m-1)}}$

applying this to any one determination we shall have its probable error

$$= 0{\cdot}8454 \frac{2\,a}{\sqrt{2 \times 1}} = 0{\cdot}8454 \sqrt{2}\,a = 1{\cdot}1955\, a$$

Of course this is a very uncertain estimation, but we have a good many such equations, and the mean of the values may I think be taken as the fairest estimate. If then n be the number of equations, I take

$$p.\ e.\ \text{of any one determination is } 1{\cdot}1955\ \frac{\Sigma\, a}{n}$$

The group of equations determining the P weights would give the probable error from their residuals; but, there being only 12 equations to determine 10 quantities, I do not think this is so satisfactory as the above method; and I have used, for evaluating the errors in them, the weights of the results, deduced as usual, combined with the *p. e.* of an equation derived as above. Assuming that we may neglect the difference between the values of R_1 and R_2 in these differences, we have 41 values of $2\,a$; and it does not seem that there is any marked tendency to decrease with the weights: I therefore take the mean of all and I get

$$\frac{\Sigma\, a}{n} = 463{\cdot}53\ \mathrm{R} \qquad p.\ e. = 554{\cdot}16\ \mathrm{R} = 55{\cdot}651 = \mathrm{e}\ \text{of Section VI}$$

$$\text{in which R is taken } 0{\cdot}100464 = \frac{36\,\mathrm{R}_1 + 5\,\mathrm{R}_2}{41}$$

Hence e^2 is 3097·0

The probable error of any determination as of that of $\mathrm{O}_{\cdot 03}$ for instance, depends :—

1st on the amount arising from its own group.

2nd probable error of the value assumed as known: in this case $\mathrm{O}_{\cdot 1}$

3rd on the probable error of the rider which was employed in taking the difference of weights in the pans.

Lastly O_1 itself has its probable error 0·000115 grains from the determinations; but there is also a portion dependent on $\mathrm{P}_{\cdot 01}$, which is involved in determining the difference between it and EI, the mean factor of $\mathrm{P}_{\cdot 01}$ being 0·0877. It is necessary, therefore, to start our evaluations with values of the probable errors of R_1 R_2 and $\mathrm{P}_{\cdot 01}$; and, fortunately, these are readily determined.

Let E be the *p. e.* of $\mathrm{P}_{\cdot 1}$ from all sources except R_1

e as before the *p. e.* of one determination

ϵ the *p. e.* of R_1

It will be seen from the table of deduction of probable errors that the value of E^2 is 758·2 and that it involves nothing unknown.

$$\begin{aligned} \text{Hence } (p.\,e.\,\mathrm{R}_1)^2 &= \epsilon^2 \\ &= (1{\cdot}003813)^2\ \mathrm{E}^2 + (0{\cdot}000842)^2\ \epsilon^2 + e^2 \\ &= 764{\cdot}0 + 0{\cdot}0000007\ \epsilon^2 + 3097{\cdot}0 = 3861{\cdot}0 \end{aligned}$$

$$\therefore \epsilon = 0{\cdot}000062 = \frac{1}{10^6}\sqrt{3861{\cdot}0}$$

$$\text{again } p.\ e.\ R_2 = \sqrt{E^2 + e^2 + 0{\cdot}000375^2\ \epsilon^2} = \frac{1}{10^6}\sqrt{3861{\cdot}0} = 0{\cdot}000062$$

$$p.\ e.\ P_{\cdot 01} = \sqrt{e^2 + 0{\cdot}099438^2\,(R_2)^2} = \sqrt{3135{\cdot}2} = 0{\cdot}000056$$

Determination of Probable Errors.

	Squares of Probable Errors (unit is 6th decimal place).						Probable error.
	From group.	From preceding groups.	From EI.	From R_1.	From $P_{\cdot 01}$.	Total.	
O_1	...	...	13225·0	...	24·1	13249·1	0·000115
$O_{\cdot 5}$	774·3	...	3306·2	12·1	6·0	4098·6	64
$O_{\cdot 4}$	1362·7	...	2116·0	64·2	3·9	3546·3	60
$O_{\cdot 3}$	960·1	...	1190·3	41·1	2·2	2193·7	47
$O_{\cdot 2}$	1734·3	...	529·0	25 7	1·0	2290·0	48
$O_{\cdot 1}$	1207·8	...	132·3	3·5	0·2	1343·8	37
$O_{\cdot 05}$	774·3	301·9	33·1	1·6	0·1	1111·0	33
$O_{\cdot 04}$	1362·7	193·2	21·2	1·0	„	1578·1	40
$O_{\cdot 03}$	960·1	108·7	11·9	1·7	„	1082·4	33
$O_{\cdot 02}$	1734·3	48·3	5·3	3·8	„	1791·7	42
$O_{\cdot 01}$	1207·8	12·1	1·3	2·5	„	1223·7	35
$O_{\cdot 005}$	774·3	305·0	0·3	3·7	„	1083·3	33
$O_{\cdot 004}$	1362·7	195·2	0·2	16·4	„	1574·5	40
$O_{\cdot 003}$	960·1	109·8	0·1	1·2	„	1071·2	33
$O_{\cdot 002}$	1734·3	48·8	0·1	4·2	„	1787·4	42
$O_{\cdot 001}$	1207·8	12·2	„	7·0	„	1227·0	35
$O_{\cdot 025}$	3097·0	2861·9	8·3	19·8	„	5987·0	77
P_{24}	1447·5	301·9	33·1	0·2	0·1	1782·8	42
P^*_{24}	1447·5	301·9	33·1	„	0·1	1782·6	42
P_{20}	2310·6	209·7	22·9	„	„	2543·2	50
P_{16}	2229·2	134·2	14·7	0·1	„	2378·2	49
P_{10}	1806·4	52·4	5·7	„	„	1864·5	43
P_6	148·1	18·9	0·9	0·5	„	168·4	13
P_3	1245·2	4·7	0·5	0·1	„	1250·5	35
P_2	2541·5	2·1	0·2	„	„	2543·8	50
P_1	1490·5	0·5	„	0·3	„	1491·3	39
P'_1	1836·0	0·5	„	„	„	1836·5	43
$P_{\cdot 6}$	2601·5	536·9	„	„	„	3138·4	56
$P_{\cdot 3}$	1114·9	134·2	„	„	„	1249·1	35
$P_{\cdot 2}$	1734·6	59·6	„	„	„	1794·2	42
$P_{\cdot 1}$	743·3	14·9	„	„	„	758·2	28
$P'_{\cdot 1}$	1982·1	14·9	„	„	„	1997·0	45

$$\text{Also } p.\,e.\,\mathrm{P}_{\cdot 06} = \frac{1}{10^6}\sqrt{2064{\cdot}6 + 169{\cdot}5 + 13{\cdot}6} = \frac{1}{10^6}\sqrt{2247{\cdot}7} = 0{\cdot}000047$$

$$p.\,e.\,\mathrm{P}_{\cdot 03} = \frac{1}{10^6}\sqrt{1032{\cdot}3 + 84{\cdot}2 + 13{\cdot}3} = \frac{1}{10^6}\sqrt{1129{\cdot}8} = 0{\cdot}000034$$

$$p.\,e.\,\mathrm{P}_{\cdot 02} = \frac{1}{10^6}\sqrt{2064{\cdot}6 + 84{\cdot}2 + 70{\cdot}0} = \frac{1}{10^6}\sqrt{2218{\cdot}8} = 0{\cdot}000047$$

SECTION IX.—*Determinations of the Weights O_2 to O_{10} and also Prinsep's Bronze Troy Pound.*

The comparisons of the weights from O_2 to O_{10} have been made with the balance Oertling No. 2. Three complete comparisons were made in each case, and the weight $\mathrm{P}_{\cdot 03}$ has been always used for valuing the scale. I have deduced the following equations of condition :—

$$\begin{aligned}
&&&\text{grs.}\\
O_3 &\equiv O_2 + O_1 \qquad\quad - 0{\cdot}37200\,\mathrm{P}_{\cdot 03} &&\equiv O_2 + O_1 \quad 0{\cdot}000000 - 0{\cdot}37200\,\mathrm{P}_{\cdot 03}\\
O_4 &\equiv O_3 + O_1 + \mathrm{P}_{\cdot 06} + 0{\cdot}74542\,\mathrm{P}_{\cdot 03} &&\equiv O_3 + O_1 + 0{\cdot}060769 + 0{\cdot}74542\,\mathrm{P}_{\cdot 03}\\
O_5 &\equiv O_3 + O_2 + \mathrm{P}_{\cdot 1} \;\; + 0{\cdot}37867\,\mathrm{P}_{\cdot 03} &&\equiv O_3 + O_2 + 0{\cdot}100085 + 0{\cdot}37867\,\mathrm{P}_{\cdot 03}\\
&\equiv O_4 + O_1 + \mathrm{P}_{\cdot 02} + 0{\cdot}60467\,\mathrm{P}_{\cdot 03} &&\equiv O_4 + O_1 + 0{\cdot}019881 + 0{\cdot}60467\,\mathrm{P}_{\cdot 03}\\
O_{10} &\equiv O_5 + O_4 + O_1 - \mathrm{P}_{\cdot 1} - \mathrm{P}_{\cdot 06} + 0{\cdot}45742\,\mathrm{P}_{\cdot 03} &&\equiv O_5 + O_4 + O_1 -\\
&&&\quad 0{\cdot}160854 + 0{\cdot}45742\,\mathrm{P}_{\cdot 03}
\end{aligned}$$

Whence I deduce by the Formulæ in Sec. VI.

$$\begin{aligned}
O_2 &\equiv 2O_1 + \mathrm{P}_{\cdot 06} + \mathrm{P}_{\cdot 02} - \mathrm{P}_{\cdot 1} + 0{\cdot}97142\,\mathrm{P}_{\cdot 03} &&\equiv 960{\cdot}011294 \text{ grs.}\\
&&& p.\,e. = 0{\cdot}000757 \;\;,,\\
O_3 &\equiv 3O_1 + \mathrm{P}_{\cdot 06} + \mathrm{P}_{\cdot 02} - \mathrm{P}_{\cdot 1} + 0{\cdot}59942 \;\;,, &&\equiv 1440{\cdot}000584 \;\;,,\\
&&& p.\,e. = 0{\cdot}000900 \;\;,,\\
O_4 &\equiv 4O_1 + 2\mathrm{P}_{\cdot 06} + \mathrm{P}_{\cdot 02} - \mathrm{P}_{\cdot 1} + 1{\cdot}34484 \;\;,, &&\equiv 1920{\cdot}084613 \;\;,,\\
&&& p.\,e. = 0{\cdot}001194 \;\;,,\\
O_5 &\equiv 5O_1 + 2\mathrm{P}_{\cdot 06} + 2\mathrm{P}_{\cdot 02} - \mathrm{P}_{\cdot 1} + 1{\cdot}94951 \;\;,, &&\equiv 2400{\cdot}123435 \;\;,,\\
&&& p.\,e. = 0{\cdot}001438 \;\;,,\\
O_{10} &\equiv 10O_1 + 3\mathrm{P}_{\cdot 06} + 3\mathrm{P}_{\cdot 02} - 3\mathrm{P}_{\cdot 1} + 3{\cdot}75167 \;\;,, &&\equiv 4800{\cdot}061736 \;\;,,\\
&&& p.\,e. = 0{\cdot}002795 \;\;,,
\end{aligned}$$

In the last Section, I have given a general formula for finding a probable error of observation. In this case, I have $\Sigma\,(o) = 3941{\cdot}2\,\frac{\mathrm{P}_{\cdot 03}}{10^5}$, whence the probable error of one equation of condition will be

$$= 0{\cdot}8454\cdot\frac{3941{\cdot}2}{\sqrt{3{\cdot}2}}\cdot\frac{\mathrm{P}_{\cdot 03}}{10^5} = 0{\cdot}000413{\cdot}5$$

The probable error of each determination of a weight depends—

1st, on its error derived from O_1 of which it is nearly a multiple,

2nd, on the error derived through the weights of the P set used to nearly counterbalance, 3rd, on the error due to the fraction of $P_{\cdot 03}$ which is involved in its determination,

4th, on the error generated in the weighings of the series.

The following Table shows the error from each source separately.

Weights.	Squares of Probable Errors from					Probable Error × 10^6.
	O_1	Equil. Weights.	$P_{\cdot 03}$	Weighments of Series.	Total.	
O_2	52900	5225	1179	514116	573420	757
O_3	119025	5225	449	685488	810187	900
O_4	211600	11968	2259	1199600	1425427	1194
O_5	330625	18624	4747	1713720	2067716	1438
O_{10}	1922500	47022	47581	5826648	7813751	2795

In making these calculations, I have neglected to attend to the fact that the P weights used have a common origin ; the sum of the squares of the probable errors given in the Table at the end of Section VIII is taken, and here (as will be seen by turning back) the error from their common origin $O._1$ is unfelt, but this is not always the case.

Among the weights in the Assay Office is a bronze Standard Troy Pound in a wooden case, on which case is stamped $\left\{\begin{array}{c}\text{J. FIELD}\\ \text{Fecit}\end{array}\right\}$, and in ink is written

J. Prinsep. $\Big\}$
Std. 1 lb

On the weight itself is engraved—

British Troy Pound.
= 5760 *grains.*
Royal Mint.

The surface of the weight is thinly oxidized, but it seems to be quite uninjured. I some time ago compared it, as well as I could, with the weights of the Gilt Troy set belonging to the Assay Office, which were supplied many years ago, and which were made by Bates in 1824. No record of any previous comparisons of these exists. The conclusion I came to was, that Prinsep's Troy Pound was about a mean of all the Gilt Pounds, the latter weights having sensible errors. I have then thought it worth while to determine the value of the Prinsep's Pound, and I find—

Prinsep's Pound $\equiv O_{10} + O_2 + P_1 + P_{\cdot 01} - 0{\cdot}487\ P_{\cdot 03}$
$\equiv 5760{\cdot}148354$ grains,

from a single complete comparison.

To find the probable error of this we must substitute in the above equation the symbolic values of $O_{10} + O_2$ and thus we have—

Prinsep's Pound $\equiv 12\,O_1 + P_{\cdot 01} + 4\,P_{\cdot 02} + 4\,P_{\cdot 06} - 3\,P_{\cdot 1} + 4{\cdot}23606\,P_{\cdot 03}$ from which the probable error will (when the errors generated in determining O_2 and O_{10}, and also in the single comparison of this weight are allowed for)

$$= \frac{1}{10^6}\sqrt{8878998} = 0{\cdot}002890$$

and we may consider Prinsep's Pound $\equiv 5760{\cdot}148 \pm 0{\cdot}003$ grains.

SECTION X.—*Considerations as to the Weights which should be made use of in a series.*

The only generally used decimal system of weights, is the metric, which is so largely diffused. In it the weights between W_1 and W_{10} are W_5, W_2 in duplicate, and W_1. When the system was adopted in England permissively, the intermediate weights chosen were W_5 W_3 and W_2. The other series in use, are those I have described before as the Bullion, and the English Grain Series. In making a series of weights of tolahs for the use of the Indian mints, I have therefore a choice; and it is worth considering which series is the best.

Commercially, the fewer weights required to make any weighment, the better. I think, too, that commercially it is undesirable to have duplicate weights, and of course none should be superfluous. In the strict *French Metric* system there are 3 weights required to weigh 9 and 8, while two are wanted for 7, 6, and 3, and the 2 is in duplicate; and in the *English modification* there are 3 weights wanted for 9 only, while 8, 7, 6, and 4 require two each, and there is no duplicate: I think then that the English modification is preferable to the original system.

In our *English Bullion* system there are never 3 weights wanted for any purpose; and 9, 8, 7, and 6 require two weights. But there are more weights than are wanted, there being 5 weights in each decad instead of 4.

In the *English Grain* system there are never 3 weights wanted; 9, 8, 7, 5. and 4 require two each, there are no duplicates, and none superfluous. I think then that the English Grain system is the best for commercial purposes.

Scientifically, the best system is that of which the values can be most accurately deduced from the standard Prototype. It is worthy of note, that neither of the Metric systems, nor the English Grain system, admit of the weights of a decad being completely determined without a second unit in each decad.

This is not an unmixed disadvantage. The 1, 10, &c., being necessary for this purpose only, and not used in common, may be kept separately, and referred to for verifications whenever desired, and by such use the errors of the weights of any decad, can be determined with comparatively little labour and without its being necessary to refer back to a primary weight. Thus, checking becomes much more manageable, and, by such a plan as I have adopted in dealing with the P set, one of the duplicates is far more accurately determined than the other, and can be laid aside for reference; the accuracy of the second being ordinarily sufficient.

The English Bullion system, as we have seen, contains the means of determining the values of all the weights without duplicates, and it is possible to have one weight practically unused, if we consent to make either 8 or 9 by three weights; this reference weight, however, is not so convenient for use as in the other cases.

The English Grain system has this advantage over all the others, that any weight from 1 to 10 requires at most two weights to make it. It has the disadvantage that 6 is not the half of ten, but, on the other hand, 3 is the half of 6; and I do not see the great gain of this relation, unless it be admitted that the system of division should be binary. In France, it was proposed that each multiple of a unit by ten, and each division by ten, should be a new unit. Some slight gain might have come if this had become a thoroughly practical procedure; but, in fact, one rarely hears of any but the kilogramme, gramme, and milligramme, and so of the other numbers of the series. I think, then, that the advantage of being able to have a single weight for half a hectogramme, &c. is dearly purchased, if there be a disadvantage in the determinations; and, in deciding on a system of weight, it is necessary to consider the probable errors of these determinations.

In each of these proposed systems, 5 comparisons, giving 5 equations, are enough to connect all the weights in a decad. If this number be alone used, then the probable errors of W_{10} derived from W_1 will be

English Grain System...... $e\sqrt{24}$
" Bullion .... $e\sqrt{34}$ { if the best equation be taken.
" Metric .... $e\sqrt{38}$
Original Metric .... $e\sqrt{26}$

In this respect the English Grain system seems best, and the Modified Metric System the worst. The Original Metric system is nearly as good as the English Grain system, and it is possibly better if a good deal more labour be given to each; but I think—when it is considered that weighing by the English Grain system requires only two weights in each decad, and that the standard system should coincide if possible with that in use—the palm will be assigned to the Grain system.

I think, too, that those who have gone with me so far, will feel as strongly as myself the great gain of a "large primary unit." It has always been considered necessary to have the primary unit very indestructible, and no doubt this is a very important point: the lead was taken in France, where the Normal Kilogramme was made of platinum; platinum was again used in England for the Standard Pound, and now standards of reference are made of a Platinum-iridium alloy. The cost of the mere metal is very heavy (a kilogramme is at present worth £60 for mere material), and the use of such a metal for large weights is of course out of the question. It seems to me doubtful whether equal accuracy could not be obtained by employing a large weight of gilt or nickelized bronze; from which copies could be made with far greater accuracy than they could be separately deduced from the small primary. It is possibly too late to change the material of Primary Standards now, but at all events the standard of Commercial Weight should be a large mass of gilt bronze.

Acting on these principles, I have nearly made a set of weights from 1000 tolahs to 0·001 tolah from these bullion weights. There will be several copies of the largest, carefully compared, some of which I trust Government will allow me to distribute. The individual weights are on what I have called the English Grain system: that is, there are—

1000 tolahs.	100 tolahs.	10 tolahs.	1· tolahs.	0·10 tolahs.	0·010 tolahs.
600 „	60 „	6 „	0·6 „	0·06 „	0·006 „
300 „	30 „	3 „	0·3 „	0·03 „	0·003 „
200 „	20 „	2 „	0·2 „	0·02 „	0·002 „
100 „	10 „	1 „	0·1 „	0·01 „	0·001 „

The final adjustments and deductions have yet to be made; but after what I have said, there will be little new in this. I have been very greatly assisted by Mr. Durham, Senior Assistant in the Assay Office, who has superintended all of the gilding; and to whom I owe devices which will allow the gilt weights to be made true almost to the accuracy of a single comparison by substitution.

TABLE I.

Logarithms for calculating the Weight of the Air adapted to Fahrenheit's Thermometer.

This Table gives 10 + the logarithm of the ratio which the weight of air at the temperature named and at Calcutta bears to that of the same volume of water when at its maximum density, the logarithm of the height of the barometer.

If B be the reading of the barometer reduced to freezing point; the temperature and V the elasticity of the vapour in the air

then log sq. of air $= A_t + \log (B - 0{\cdot}238\ V)$.

The value of A_t at sea-level in latitude 45° can be got from these numbers by adding 0·000785·7 to each and thence the value for any other place.

Temp.	A_t.	$\Delta^{(1)} A_t$.	Temp.	A_t.	$\Delta^{(1)} A_t$.	Temp.	A_t.	$\Delta^{(1)} A_t$.
30°	5·6366164	8848	55°	5·6150200	8419	80°	5·5944469	8030
1	6357316	8830	6	6141781	8402	1	5936439	8015
32	6348486	8812	7	6133379	8387	2	5928424	8000
3	6339674	8794	8	6124992	8371	3	5920423	7985
4	6330880	8776	9	6116621	8354	4	5912438	7971
35	5·6322104	8759	60	5·6108267	8338	85	5·5904467	7957
6	6313345	8741	1	6099929	8323	6	5896510	7942
7	6304604	8724	2	6091606	8306	7	5888568	7927
8	6295380	8705	3	6083300	8291	8	5880641	7913
9	6287175	8689	4	6075009	8275	9	5872728	7899
40	5·6278486	8671	65	5·6066734	8258	90	5·5864829	7884
1	6269815	8654	6	6058476	8244	1	5856945	7870
2	6261161	8637	7	6050232	8227	2	5849075	7856
3	6252524	8619	8	6042005	8212	3	5841219	7841
4	6243905	8603	9	6033793	8197	4	5833378	7828
45	5·6235302	8585	70	5·6025596	8181	95	5·5825550	7813
6	6226717	8569	1	6017415	8166	6	5817737	7799
7	6218148	8552	2	6009249	8151	7	5809938	7785
8	6209596	8535	3	6001098	8135	8	5802153	7772
9	6201061	8518	4	5992963	8120	9	5794381	7757
50	5·6192543	8502	75	5·5984843	8105	100	5·5786624	
1	6184041	8485	6	5976738	8090			
2	6175556	8468	7	5968468	8074			
3	6167088	8452	8	5960514	8060			
4	6158636	8436	9	5952514	8045			

TABLE II.

Logarithm of the Ratio of the Density of Water to its Maximum Density for each degree of Fahrenheit's Thermometer.

This Table is founded on that given at page 66 &c. of the Report of the Warden of the Standards for 1871-72. Certain values of the Table there given, were taken and the constants found to express them in a series of the form A $(t - n_1)^2 + B(t - n_2)^3$, and, these having then been suitably modified to change the scale of the thermometer from Centigrade to Fahrenheit, the present Table was computed.

Temp.	Log. Ratio.	$\Delta^{(1)}$ R.	Temp.	Log. Ratio.	$\Delta^{(1)}$ R.	Temp.	Log. Ratio.	$\Delta^{(1)}$ R.
30°			55°	0·0002400	+302	80°	0·0014313	639
1			6	0002702	318	1	0·0014952	650
2	0·0000546	—143	7	0003020	335	2	0015602	659
3	0000404	—121	8	0003355	350	3	0016261	670
4	0000283	— 99	9	0003705	367	4	0016931	679
35	0·0000184	— 78	60	0·0004072	381	85	0·0017610	688
6	0000106	— 56	1	0004453	397	6	0018298	698
7	0000050	— 35	2	0004850	412	7	0018996	706
8	0000015	— 15	3	0005262	426	8	0018702	715
9	0000000	+ 06	4	0005688	441	9	0020417	723
40	0·0000006	+ 27	65	0·0006129	455	90	0·0021440	732
1	0000033	47	6	0006584	469	1	0021872	739
2	0000080	66	7	0007053	483	2	0022611	747
3	0000146	86	8	0007536	497	3	0023358	754
4	0000232	105	9	0008033	509	4	0024112	762
45	0·0000337	124	70	0·0008542	523	95	0·0024874	768
6	0000461	144	1	0009065	535	6	0025642	775
7	0000605	162	2	0009600	548	7	0026417	782
8	0000767	180	3	0010148	560	8	0027199	787
9	0000947	198	4	0010708	572	9	0027986	794
50	0·0001145	216	75	0·0011280	584	100	0·0028780	
1	0001361	234	6	0011864	596			
2	0001595	251	7	0012460	607			
3	0001846	269	8	0013067	617			
4	0002115	285	9	0013684	629			

TABLE III.

Logarithms for facilitating the Calculation of the Cubical Expansion of Metals.

Log. $(1 + EM_{t}.)$

	G = M Gold — 339·14	S = M Silver — 441·41	P = M Platinum — 208·32	B = M Baily's metal — 394·98.	Br = M Brass — 398·27
1	0·000010598	0·000013794	0·000006510	0·000012343	0·000012446
2	21196	27588	13020	24686	24892
3	31794	41382	19530	37029	37338
4	42392	55176	26040	49372	49784
5	52990	68970	32550	61715	62230
6	63588	82764	39060	74058	74676
7	74186	96558	45570	86401	87122
8	84784	110352	52080	98744	99568
9	95382	124046	58590	111087	112014

This table is founded on the supposition that up to 100° of Fahrenheit's Thermometer; log expansion for $n^\circ = n \times$ log expansion for 1°; which is true sufficiently. The linear expansions of Gold and Silver have been taken from Vol. I of Professor Miller's Chemistry; the others from the paper in the 'Philosophical Transactions' on Standard Weights.

The argument of this Table is to be T — 32°; or T itself can be taken if the number at the head of the column be applied.

Thus for brass at 85·35° we have

Br 50°	0·000622·30	or Br 80°	0·000995·68
3	37·34	5	62·23
0·3	3·73	·3	3·73
0·05	0·62	·05	0·62
		Const.	— 398·27
	0·000663·99		0·000663·99

May 24th, 1879.

TYPE COMPARISON I.

Comparisons of EI with O_1.

Oertling, No. 1.

Weight on left side.	Weight on right side.	SCALE READINGS.		Deduced Mean.	REMARKS.
		Low.	High.		
EI	$O_1 + 1{\cdot}2\,\frac{R_2}{10}$	5·7 6·1	9·5 9·2	7·54	h. m. Commenced at 6·48 A. M.
$EI + P_{\cdot 10}$	Do.	13·6 13·7	18·0 17·8	15·81	in. A. Bar. 29·60. Temp. 85°·0 F. Dry Bulb 85°·9. Wet Bulb 81°·0.
$O_1 + P_{\cdot 01}$	$EI + 1{\cdot}2\,\frac{R_2}{10}$	13·1 13·4	17·4 17·2	15·21	
O_1	Do.	3·4 3·8	10·7 10·3	6.95	
Do.	Do.	3·4 3·8	10·0 9·6	6·60	
$O_1 + P_{\cdot 01}$	Do.	13.3 13·6	16·6 16·3	15·03	
$EI + P_{\cdot 01}$	$O_1 + 1{\cdot}2\,\frac{R_2}{10}$	12·8 13·3	18·9 18·5	15·99	
EI	Do.	3·0 3·6	11.9 11·4	7·61	in. Bar. 29·61. Temp. 86°·0 F. Dry Bulb. 85°·4 Wet Bulb 80°·1. h. m. Ended at 7·33 A. M.

$$\text{Hence } EI \bumpeq O_1 + 1{\cdot}2\,\frac{R_2}{10} - \frac{2{\cdot}46}{8{\cdot}27}\,P_{\cdot 01} \bumpeq O_1 + 1{\cdot}2\,\frac{R_2}{10} - 0{\cdot}297\,P_{\cdot 01}.$$

$$EI \bumpeq O_1 - 1{\cdot}2\,\frac{R_2}{10} + \frac{3{\cdot}05}{8{\cdot}26}\,P_{\cdot 01} \bumpeq O_1 - 1{\cdot}2\,\frac{R_2}{10} + 0{\cdot}369\,P_{\cdot 01}.$$

$$EI \bumpeq O_1 - 1{\cdot}2\,\frac{R_2}{10} + \frac{3{\cdot}40}{8{\cdot}43}\,P_{\cdot 01} \bumpeq O_1 - 1{\cdot}2\,\frac{R_2}{10} + 0{\cdot}404\,P_{\cdot 01}.$$

$$EI \bumpeq O_1 + 1{\cdot}2\,\frac{R_2}{10} - \frac{2{\cdot}39}{8{\cdot}38}\,P_{\cdot 01} \bumpeq O_1 + 1.2\,\frac{R_2}{10} - 0{\cdot}285\,P_{\cdot 01}.$$

$$\therefore 4\,EI \equiv 4\,O_1 + 0{\cdot}191\,P_{\cdot 01} : \text{or } EI \equiv O_1 + 0{\cdot}04775\,P_{\cdot 01}.$$

Note.—In the original the succession of observations has been distinguished, but want of space rendered it necessary to give this up.

TYPE COMPARISON II.

June 5th, 1879. Oertling No. 1.

Comparisons of O_1 with $O_{\cdot 5} + O_{\cdot 4} + O_{\cdot 1} = S$.

Weight on left side.	Weight on right side.	SCALE READINGS.		Deduced Mean.	REMARKS.
		Low.	High.		
$O_1 + 5\frac{R_1}{10}$	$S_1 + 4{\cdot}2\frac{R_2}{10}$	6·3 6·6	10·2 10·0	8.34	
$O_1 + 6\frac{R_1}{10}$	Do.	13·0 13·4	19·0 18·6	15·90	
$S + 0{\cdot}6\frac{R_1}{10}$	$O_1 + 4{\cdot}2\frac{R_2}{10}$	3·0 3·3	10·6 10·3	6·88	
$S + 1{\cdot}6\frac{R_1}{10}$	Do.	11·0 11·4	17·6 17·2	14·40	
Do.	Do.	9·9 10·4	19.4 18·8	14·49	
$S + 0{\cdot}6\frac{R_1}{10}$	Do.	4·1 4·4	9·7 9·4	6·98	
$O_1 + 6\frac{R_1}{10}$	$S + 4{\cdot}2\frac{R_2}{10}$	12·8 13·1	17·9 17·4	15·40	
$O_1 + 5\frac{R_1}{10}$	Do.	6·0 6·2	9·9 9·6	7·99	

Hence $O_1 \hat{=} S + 4{\cdot}2\frac{R_2}{10} - \left(5{\cdot}0 + \frac{1{\cdot}66}{7{\cdot}56}\right)\frac{R_1}{10} \hat{=} S + 4{\cdot}2\frac{R_2}{10} - 0{\cdot}5226\, R_1$.

$$O_1 \hat{=} S - 4{\cdot}2\frac{R_2}{10} + \left(0{\cdot}6 + \frac{3{\cdot}12}{7{\cdot}52}\right)\frac{R_1}{10} \hat{=} S - 4.2\frac{R_2}{10} + 0{\cdot}1015\, R_1.$$

$$O_1 \hat{=} S - 4{\cdot}2\frac{R_2}{10} + \left(0{\cdot}6 + \frac{3{\cdot}02}{7{\cdot}51}\right)\frac{R_1}{10} \hat{=} S - 4{\cdot}2\frac{R_2}{10} + 0{\cdot}1002\, R_1.$$

$$O_1 \hat{=} S + 4{\cdot}2\frac{R_2}{10} - \left(5{\cdot}0 + \frac{2{\cdot}01}{7{\cdot}41}\right)\frac{R_1}{10} \hat{=} S + 4{\cdot}2\frac{R_2}{10} - 0{\cdot}5272\, R_1.$$

$$\therefore 4\,O_1 \equiv 4\,S - 0{\cdot}8481\, R_1 \text{ or } O_1 \equiv O_{\cdot 5} + O_{\cdot 4} + O_{\cdot 1} - 0.212025\, R_1,$$

TYPE COMPARISON III.

October 22nd, 1879. Oertling No. 2.

Comparisons of O_5 with $O_1 + O_4 + P_{\cdot 02} = S$.

Weight on left side.	Weight on right side.	SCALE READINGS.		Deduced Mean.	REMARKS.
		Low.	High.		
S	O_5	9·5 9·9	14·1 13·8	11·91	
$S + P_{\cdot 03}$	Do.	15·0 15·5	22·7 22·2	18·73	
O_5	$S + P_{\cdot 03}$	12·0 12·2	14·6 14·3	13·34	
Do.	S	16·3 16·7	23·0 22·6	19·55	
Do.	Do.	16·1 16·6	23·3 22·8	19·58	
Do.	$S + P_{\cdot 03}$	12·2 12·4	14·1 14·0	13·21	
$S + P_{\cdot 03}$	O_5	15·4 15·7	21·0 20·7	18·13	
S	Do.	10·8 10·9	13·0 12·8	11·91	

Hence $O_5 \bumpeq S + \frac{3\cdot09}{6\cdot82} P_{\cdot 03} \bumpeq S + 0\cdot453\ P_{\cdot 03}$.

$$O_5 \bumpeq S + \frac{4\cdot55}{6\cdot21} P_{\cdot 03} \bumpeq S + 0\cdot732\ P_{\cdot 02}.$$

$$O_5 \bumpeq S + \frac{4\cdot58}{6\cdot21} P_{\cdot 03} \bumpeq S + 0\cdot737\ P_{\cdot 03}.$$

$$O_5 \bumpeq S + \frac{3\cdot09}{6\cdot22} P_{\cdot 03} \bumpeq S + 0\cdot497\ P_{\cdot 03}.$$

$$\therefore 4\ O_5' \equiv 4\ S + 2\cdot419\ P_{\cdot 03} \text{ and } O_5 \equiv S + 0\cdot60475\ P_{\cdot 03}.$$
$$\equiv O_1 + O_4 + P_{\cdot 02} + 0\cdot64475 P_{\cdot 03}.$$

P. S. *June 29th*, 1880.—After the earlier part of this paper was drafted, I learnt that M. St. Claire Deville had proposed to make standards of the Commercial Kilogram in a new manner. The metal is to be the Platinum-iridium alloy so as to secure hardness and indestructibility, but, in order that the density may be nearly that of brass, it is to be hollow, the parts are to be soldered together by fusion so as to enclose a constant mass of air, which, of course, will be included in the weighings. This plan has been adopted by the International Commission for making the European Metric Standards, and will no doubt be a great improvement on the old Commercial Standard of France, which is made of brass. The volume of these weights is to be 125 cubic centimetres, so that the density will be 8·0; which is a little lower than that of good sound weights of brass, and materially lower that that of gilt bronze; while it is greater than that of iron.

Certainly, the visible Commercial unit, to which reference can be made, appears preferable to the imaginary unit of England. Such a weight would vary in Calcutta with respect to the scientific unit to the extent of about 11 milligrams, and it would be needless to take notice (for commercial purposes) of the much smaller variations with respect to such weight as may be compared with it.

VI.—*On the High Atmospheric Pressure of* 1876-78 *in Asia and Australia, in relation to the Sun-spot Cycle.—By* Henry F. Blanford, *Met. Rep. to the Govt. of India.*

(Received December 24th, 1879; Read January 6th, 1880.)

(With Plate I.)

The three years 1876, 1877, and 1878, more especially the two former, were characterized by a deficiency of rainfall in one or many parts of India, and by a more general and very persistent excess of atmospheric pressure. With but slight and local interruptions, from August (in some parts of India from May) 1876 to August (in some cases only to May) 1878, over the whole of the Indian area, the barometer ranged above the average of many years. Nor was this excess of pressure restricted to the land. The register of Port Blair at the Andaman Islands, and that of Nancowry at the Nicobars, shew that, at these insular stations, the excessive pressure was of greater duration and more persistent and intense than at any continental station at or near the sea-level; indeed, with one striking exception, more intense than at any other station in the entire region. At these islands, the pressure rose above the average in May 1876; and, from that time to August 1878 inclusive, the mean pressure of every month was from ·004″ to ·071″ in excess of the average; derived, in the case of Port Blair from eleven, and, in that of Nancowry, from six years' registers. On the mean of the whole period and of the two stations, the excess amounted to ·0327″.

The single exceptional station, which shews a greater average excess than the Bay islands, is the hill station of Darjiling in the Sikkim Himalaya, at an elevation of nearly 7000 feet above the sea. At this station, where the barometer has been registered steadily for upwards of 12 years, the mean excess of the same period of 28 months was not less than ·0332″; or, since the first rise took place in August 1876, the mean of the whole unbroken period of 25 months' excess was ·0379″. On the plains of Bengal, the mean excess (average of six stations) was only ·0298 on the 28 months and ·0354 on the 25 months, a reduction, as compared with Darjiling, which is probably explained by the fact that, in Bengal, as indeed generally in India, the mean temperature of the air was also on the whole considerably in excess of the average; so that the stratum of air resting on the plains had less than the average density. This fact is of pregnant importance; for it shews that the excessive pressure in question was due to the condition of the higher atmosphere; of those strata, at all events, that lay above the elevation of 7000 feet; and that, in fact, the prevailing excess, instead of being caused by the conditions recorded at observatories on the plains, was to some extent counteracted by a deficiency in the mass and static pressure of the lower strata.

In his report on the Meteorology of India in 1877, Mr. Eliot drew attention to the persistently high barometric pressure of that year, and pointed out that the barometric registers of Sydney and Melbourne in Australia also "indicated, on the whole, a marked tendency to excessive pressure; and that, therefore, there is a slight probability that this is a feature of the whole area, from India southwards to Australia, including the sea area of the Indian Ocean." Furthermore, that it appeared, from the register of Hongkong, "that the pressure in that part of China was as markedly and persistently in defect as it was in excess in India."

A re-examination of the data shews, however, that this latter conclusion is extremely doubtful, and indeed probably mistaken. I find that the Hongkong barometric registers of past years have been so variously treated that no trustworthy comparison can be instituted on them; and, on the other hand, I find that the excellent registers of Zi-ka-wei near Shanghai point to an opposite conclusion, and shew that here also, on the east coast of China, the pressure was excessive during the greater part of the period in question, though to a much less degree than in the Indian region.

In the case of Australia, Mr. Eliot compared the registers of Sydney and Melbourne only. I have examined that of Adelaide in addition, and find that not only does it confirm the general conclusion drawn from the two former registers, but, further, shews that in South Australia the excess was more intense than at any other station yet examined either in Australia or India. At this station, the pressure rose above the average in May 1876 (as at the islands in the Bay of Bengal) and, with the exception of 4 months, remained in excess until June 1878; the average excess of the whole period being not less than ·0681″ or $\frac{1}{15}$ of an inch of the barometer. At Melbourne, during the same period, it averaged ·0387″ and was less prolonged. For Sydney, I have registers only up to September 1878, and these shew an excess much below that of Melbourne. It would seem, therefore, that in Australia as in Asia the excessive pressure diminished towards the east coast of the continent.

As a link between the data of the Indian and Australian regions, I have the registers of Singapore and Batavia; for the latter of which I am indebted to the kindness of Dr. Bergsma. At Singapore, the same barometer has not been in use throughout. The barometer registered in 1869 and 1870 having been injured, was replaced by another in 1871 which had never been compared directly or indirectly with the former; and the relative values of the registers in the two former and subsequent years are, therefore, more or less open to doubt. The position of the instrument also has been changed once or twice; but, in comparing the registers of past years, I have applied an appropriate correction for the changes of level. The registers extend from May 1869 to the present time. According to these, during the four and a half years, from May 1869 to October 1873, and certainly from July 1871, in only two months, was the mean pressure of any month slightly above the general average of the month, as deduced from the whole series of years; whereas, from November 1873 to February 1875 (16 months in all), ten months ranged above it, and six only below it; and from March 1875 to June 1878, every month shews an excess, excepting April 1876 (which was the same as the average) and November 1876 and December 1877, which were slightly below it. Hence, it appears that the excessive pressure began earlier and was more prolonged at Singapore than at any other station yet examined; but it was less than half as intense as at Adelaide; the average of the 26 months, May 1876 to June 1878, being only ·0293″.

The register of Batavia affords evidence very similar to that of Singapore. Here also from November 1869 to August 1873, a period of 3 years and 10 months, in only four months did the pressure range slightly above the average; from the latter date to April 1876, in ten months it exceeded the average; and from May 1876 to August 1878, it was above the average in every month except three. The average excess of this period was ·0256.″ Thus, at these two sub-equatorial stations, there is evidence of a gradual rise of atmospheric pressure since 1870; and the Batavian register recorded under the careful superintendence of Dr. Bergsma is of the highest validity.

In Ceylon and Southern India, the excessive pressure was of shorter duration than at the Bay islands, and on the average of the whole period not more than half as great; *viz.*, ·020′.

As far as can be judged, then, from the available evidence, the excess appears to have been greatest (in the Indian region) on an axis lying between the Nicobars and Bengal. And, in Australia, at Adelaide, or possibly to the westward of that station. In the absence of any sufficient registers for Western Australia, this must remain an open question. To the eastward, however, it certainly diminished greatly at Melbourne, and still more at Sydney. Whether, however, the condition of excessive pressure was continuous between Batavia and South Australia or otherwise, there is no distinct evidence to show.

In Asia, the excess was less in Assam than in Bengal, and was comparatively small at Shanghai (Zi-ka-wei). To the westward, it also diminished, but not quite regularly; since, in Orissa and on the Gangetic plains, it was less than on the plateaux of Chutia Nagpur and Bundelkand, and slightly less than in Rajputana and Sind. Some of these irregularities probably depend on variations of the temperature, and therefore density, of the lower atmosphere; and partly also are apparent only, and owing to the fact that the averages which have served as the standard of the comparison are derived, in some cases, from longer series of years than in others. That, notwithstanding these irregularities, there was, on the whole, a general decrease of the excessive pressure to the westward of the axis above defined, appears, however, pretty clearly, from the following average values of this excess for the whole period of the 28 months of its duration.

Bengal	+ ·0298″	Gangetic plain	+ ·0191″	...Punjab	+ ·0132″		
Arakan	+ ·0317″	Chutia Nagpur & Bundelkand	+ ·0284′	Rajputana and Sind	+ ·0215″		
Bay islands	+ 0327″						
		Orissa	+ 0164″	Nagpur and Berar	+ ·0219″	Bombay	+ ·0196″
				Dakhan	+ ·0127″	W.Coast	+ ·0102″
				Carnatic	+ ·0199″	Ceylon	+ ·020″

It may here be observed that this axis or ridge of greatest intensity, if prolonged, lay across the middle of the two great continental masses, Asia and Australia, from Western Siberia to South Australia; a position which suggests the probability that the phenomenon was in some measure dependent on the presence and position of these large land masses.

The variation of the anomalous pressure from month to month, at all the stations above referred to, is given in the accompanying Table I, which shows the deviation of the pressure, in each month, from the average of that month and place (or district), as derived from the registers of many years.

TABLE I.—*Deviation of pressure in each month from the*

		Punjab.	Gangetic plain.	Bundelkand, &c.	South Central Provinces and Berar.	Dakhan and Mysore.	East Coast and Carnatic.
1876.	April, ...	— ·045	— ·054	— ·033	— ·055	— ·043	— ·054
	May, ...	— ·045	— ·046	— ·037	— ·043	— ·018	— ·029
	June, ...	— ·008	— ·012	+ ·008	— ·003	— ·002	— ·008
	July, ...	— ·037	— ·048	— ·049	— ·041	— ·026	— ·025
	August, ...	+ ·004	+ ·005	+ ·015	0	+ ·005	— ·015
	September, ...	+ ·024	+ ·014	+ ·016	+ ·010	+ ·020	— ·001
	October, ...	+ ·034	+ ·044	+ ·044	+ ·042	+ ·028	+ ·022
	November, ...	— ·008	— ·015	— ·004	— ·004	— ·009	— ·004
	December, ...	+ ·051	+ ·034	+ ·042	+ ·044	+ ·032	+ ·044
1877.	January, ...	+ ·067	+ ·067	+ ·069	+ ·059	+ ·030	+ ·056
	February, ...	+ ·024	+ ·052	+ ·054	+ ·031	— ·004	+ ·021
	March, ...	+ ·015	+ ·024	+ ·033	+ ·029	+ ·005	+ ·026
	April, ...	+ ·053	+ ·060	+ ·065	+ ·050	+ ·025	+ ·045
	May, ...	+ ·030	+ ·025	+ ·055	+ ·033	+ ·010	+ ·019
	June, ...	+ ·032	+ ·037	+ ·038	+ ·034	+ ·026	+ ·033
	July, ...	+ ·011	+ ·012	+ ·040	+ ·057	+ ·054	+ ·038
	August, ...	— ·022	— ·027	— ·005	+ ·011	+ ·032	+ ·022
	September, ...	+ ·020	+ ·018	+ ·051	+ ·060	+ ·028	+ ·045
	October, ...	+ ·043	+ ·048	+ ·053	+ ·060	+ ·033	+ ·067
	November, ...	+ ·014	+ ·008	+ ·016	+ ·041	+ ·032	+ ·031
	December, ...	— ·008	— ·007	— ·004	+ ·002	+ ·003	+ ·009
1878.	January, ...	+ ·031	+ ·035	+ ·044	+ ·018	+ ·011	+ ·030
	February, ...	+ ·030	+ ·028	+ ·034	+ ·028	+ ·038	+ ·046
	March, ...	+ ·040	+ ·043	+ ·062	+ ·034	+ ·031	+ ·046
	April, ...	+ ·022	+ ·041	+ ·050	+ ·035	+ ·027	+ 038
	May, ...	+ ·029	+ ·050	+ ·048	+ ·023	+ ·012	+ ·023
	June, ...	+ ·014	— ·007	+ ·020	+ ·006	— ·010	— ·008
	July, ...	+ ·034	+ ·033	+ ·035	+ ·012	— ·015	— ·005
	August, ...	+ ·018	+ ·019	+ ·002	— ·014	— ·030	— ·009
	September, ...	— ·039	— ·031	— ·023	— ·041	— ·039	— ·028

average of the month and place.

Orissa.	Lower Bengal.	Darjeeling.	Assam and Cachar.	Arakan.	Bay Islands.	Singapore.	Batavia.	Rajputana and Sind.
— ·062	— ·052	— ·016	— ·048	— ·044	— ·023	0	— ·037	— ·040
— ·037	— ·017	— ·005	— ·002	— ·012	+ ·025	+ ·033	+ ·008	— ·025
— ·003	+ ·014	+ ·004	— ·002	+ ·012	+ ·023	+ ·030	+ ·001	+ ·002
— ·050	— ·045	— ·018	— ·035	— ·027	+ ·019	+ ·032	+ ·009	— ·047
— ·017	+ ·005	+ ·025	— ·018	— ·010	+ ·009	+ ·023	— ·003	+ ·002
— ·017	+ ·014	+ ·046	+ ·003	+ ·013	+ ·033	+ ·025	+ ·003	+ ·030
+ ·022	+ ·047	+ ·060	+ ·058	+ ·048	+ ·034	+ ·040	+ ·012	+ ·036
— ·036	— ·029	+ ·002	— ·029	— ·030	+ ·008	— ·014	+ ·004	+ ·009
+ ·034	+ ·028	+ ·043	+ ·030	+ ·042	+ ·049	+ ·037	+ ·033	+ ·038
+ ·064	+ ·065	+ ·107	+ ·084	+ ·073	+ ·066	+ ·060	+ ·054	+ ·054
+ ·062	+ ·072	+ ·031	+ ·065	+ ·060	+ ·039	+ ·043	+ ·047	+ ·023
+ ·034	+ ·038	+ ·029	+ ·027	+ ·044	+ ·029	+ ·026	+ ·028	+ ·014
+ ·065	+ ·070	+ ·028	+ ·061	+ ·058	+ ·034	+ ·029	+ ·030	+ ·039
+ ·041	+ ·042	+ ·019	+ ·032	+ ·037	+ ·027	+ ·020	+ ·016	+ ·047
+ ·015	+ ·032	+ ·041	+ ·022	+ ·014	+ ·049	+ ·049	+ ·051	+ ·034
+ ·032	+ ·023	+ ·015	— ·001	+ ·002	+ ·045	+ ·045	+ ·057	+ ·065
— ·032	— ·032	+ ·012	— ·037	— ·040	+ ·034	+ ·054	+ ·066	+ ·044
+ ·057	+ ·058	+ ·037	+ ·051	+ ·078	+ ·056	+ ·040	+ ·054	+ ·055
+ ·062	+ ·077	+ ·066	+ ·081	+ ·082	+ ·071	+ ·049	+ ·058	+ ·032
+ ·008	+ ·008	+ ·028	+ ·017	+ ·031	+ ·042	+ ·036	+ ·033	+ ·017
— ·018	— ·003	+ ·011	— ·004	+ ·016	+ ·015	— ·003	+ ·008	— ·008
+ ·019	+ ·045	+ ·021	+ ·044	+ ·054	+ ·035	+ ·015	+ ·026	+ ·038
+ ·017	+ ·030	+ ·042	+ ·035	+ ·062	+ ·046	+ ·033	+ ·051	+ 037
+ ·036	+ ·050	+ ·068	+ ·069	+ ·073	+ ·051	+ ·036	+ ·039	+ ·041
+ ·040	+ ·055	+ ·059	+ ·058	+ ·042	+ ·032	+ ·016	+ ·012	+ ·029
+ ·035	+ ·060	+ ·029	+ ·049	+ ·035	+ ·004	+ ·002	— ·002	+ ·013
— ·011	+ ·015	+ ·026	+ ·011	+ ·019	+ ·007	+ ·005	+ ·006	+ ·017
+ ·024	+ ·067	+ ·056	+ ·066	+ ·071	+ ·012	— ·014	— ·022	+ ·001
+ ·003	+ ·047	+ ·047	+ ·050	+ ·061	+ ·021	+ ·014	+ ·002	— ·036
— ·042	— ·023	— ·009	— ·028	— ·025	— ·014	— ·011	— ·015	— ·040

TABLE I.—*Deviation of pressure in each month from the average of the month and place.*—(Continued.)

		Bombay.	Ceylon.	Zi-ka-wei.	Sydney.	Melbourne.	Adelaide.
1876.	April, ...	— ·039	— ·039	— ·037	— ·167	— ·094	— ·002
	May, ...	+ ·009	— ·003	+ ·030	+ ·072	— ·106	+ ·110
	June, ...	+ ·026	+ ·002	+ ·018	+ ·039	+ ·043	+ ·094
	July, ...	— ·020	— ·007	+ ·021	+ ·007	+ ·097	+ ·072
	August, ...	+ ·018	— ·007	— ·016	+ ·013	+ ·048	+ ·101
	September, ...	+ ·034	+ ·006	+ ·043	— ·061	+ ·001	+ ·100
	October, ...	+ ·045	+ ·017	— ·018	+ ·120	— ·060	— ·031
	November, ...	— ·004	— ·013	— ·071	— ·191	— ·119	— ·053
	December, ...	+ ·023	+ ·028	+ ·014	+ ·035	+ ·056	+ ·077
1877.	January, ...	+ ·038	+ ·045	+ ·022	— ·051	+ ·007	+ ·040
	February, ...	+ ·027	+ ·032	+ ·036	+ ·052	+ ·026	+ ·026
	March, ...	+ ·025	+ ·017	— ·011	+ ·061	+ ·060	+ ·057
	April, ...	+ ·029	+ ·027	— ·019	+ ·024	+ ·053	+ ·079
	May, ...	+ ·035	+ ·017	+ ·012	— ·209	— ·152	— ·112
	June, ...	+ ·055	+ ·057	+ ·006	+ ·196	+ ·204	+ ·285
	July, ...	+ ·097	+ ·043	+ ·005	+ ·137	+ ·163	+ ·090
	August, ...	+ ·052	+ ·050	+ ·015	+ ·065	+ ·087	+ ·118
	September, ...	+ ·038	+ ·040	+ ·024	+ ·077	+ ·152	+ ·162
	October, ...	+ ·034	+ ·060	+ ·030	Not received.	+ ·121	+ ·101
	November, ...	+ ·020	+ ·029	+ ·004		— ·002	+ ·081
	December, ...	— ·015	— ·003	— ·008		+ ·011	+ ·063
1878.	January, ...	+ ·015	+ ·020	+ ·045		+ 125	+ ·114
	February, ...	+ ·043	+ ·037	+ ·079		+ ·064	+ ·092
	March, ...	+ ·039	+ ·035	+ ·080		— ·018	+ ·013
	April, ...	+ ·020	+ ·026	+ ·052		— ·039	— ·025
	May, ...	+ ·025	+ ·009	— ·015		+ ·072	+ ·104
	June, ...	+ ·022	+ ·007	— ·001		— ·099	+ ·014
	July, ...	0	— ·010	+ ·020		— ·155	— ·161
	August, ...	— ·049	— ·003	+ ·033		— ·076	+ ·003
	September, ...	— ·083	— ·009	— ·058		— ·115	— ·133

Evidence bearing on the northern prolongation of the axis of maximum pressure across Central Asia (at least up to the end of 1877) is afforded by the old established observatories of the Russian empire; the registers of which, since 1847, are given in the 'Annales de l'Observatoire Physique Central de Russie'. Before, however, proceeding to notice the barometric condition of this region during the special period in question, I must draw attention to another class of facts, which have an important bearing on the subject, and which, although not entirely new, have been brought out in the present investigation with remarkable clearness and prominence.

I have already noticed the evidence furnished by the registers of Singapore and Batavia, of a persistently low pressure from 1869 to the latter part of 1873, of its gradual rise during the subsequent years, and its culmination in 1877. The Batavian register extends as far back as 1866; comprising, therefore, a period of 13 years, and somewhat more than a complete cycle of sun-spot variation. The deviation of the mean pressure of each year from the general average of the whole period is given in the second column of Table II; and, in the first, I have given the variation of Wolf's sun-spots numbers up to 1875, the latest date for which I have them. I need only add that from 1875 to the early part of the present year, was a prolonged period of minimum solar activity. The coincidence of the barometric variation with that of the sun-spots is too obvious to need comment; and it is emphatically to be noticed that the minimum of pressure coincides with the maximum of spots, and *vice versâ*. The remaining columns of the table give the annual deviation of the mean pressure of each year from the general local averages, for the stations Singapore, Port Blair, Colombo, Akyab, Chittagong, Calcutta, and Darjiling, from 1867 to 1878; and the accompanying plate represents graphically the course of variation at each station from year to year. All these exhibit, more or less distinctly, an oscillation similar to that of Batavia; being most pronounced at insular and sub-equatorial stations. Table III gives the annual barometric variation of Calcutta and Bombay from 1848 and 1852 respectively, and Plate I, the corresponding curves.

TABLE II.—*Annual variation of barometric pressure in Indo-Malayan region.*

Years.	Wolf's sun-spot numbers.	Batavia.	Singapore.	Colombo.	Port Blair.	Akyab.	Chittagong.	Calcutta.	Darjiling.	Bombay.
1867	8·8	+ ·006	...	...	...	+ ·009	— ·017	+ ·022	(6) — ·008	+ ·015
'68	36·8	+ .020	...	...	+ ·029	+ ·003	— ·019	+ ·022	— ·017	+ ·027
'69	78·6	+ ·011	(1) — ·018	...	+ ·006	(4) + ·012	— ·019	+ ·006	— ·019	+ ·005
'70	131·8	— ·023	— ·044	...	— ·042	(5) — ·001	— ·026	— ·011	— ·009	— ·012
'71	113·8	— ·009	(2) — ·011	...	(3) — ·006	— ·013	— ·008	— ·008	— ·007	— ·004
'72	99·7	— ·020	— ·023	— ·020	— ·020	— ·017	— ·001	+ ·004	+ ·009	— ·014
'73	67·7	— ·010	— ·017	— ·005	— ·013	— ·021	+ ·007	— ·008	+ ·001	— ·010
'74	43·1	— ·006	+ ·018	+ ·003	— ·007	+ ·001	+ ·023	+ ·005	+ ·008	— ·011
'75	18·9	— ·011	+ ·018	— ·004	— ·006	— ·008	+ ·002	— ·008	+ ·009	0
'76	...	— ·002	+ ·019	+ ·002	+ ·010	— ·009	— ·003	— ·009	+ ·006	+ ·007
'77	...	+ ·042	+ ·037	+ ·037	+ ·052	+ ·036	+ ·039	+ ·044	+ ·035	+ ·037
'78	...	— ·001	— ·002	0	+ ·010	+ ·012	+ ·022	+ ·014	+ ·012	— ·011

(1) Last eight months.

(2) Last six months.

(3) January, February and last six months.

(4) Wanting February and December.

(5) Wanting January.

(6) Last six months only.

TABLE III.—*Annual variation of pressure at Calcutta and Bombay.*

Years.	Calcutta.	Bombay.	Years.	Calcutta.	Bombay.
1847	...	— ·012	1858	— ·003	+ ·003
'48	...	— ·004	'59	+ ·009	+ ·004
'49	...	— ·011	'60	— ·019	— ·005
'50	...	— ·001	'61	— ·023	— ·012
'51	...	— ·013	'62	— ·017	— ·026
'52	...	— ·004	'63	— ·024	— ·017
'53	— ·013	+ ·005	'64	— ·011	+ ·023
'54	— ·002	— ·005	'65	+ ·018	+ ·002
'55	+ ·005	+ ·015	'66	+ ·004	+ ·013
'56	— ·014	— ·003	'67	+ ·022	+ ·015
'57	— ·013	— ·001	'68	+ ·022	+ ·027

From these facts, it may be concluded that, in the Indo-Malayan region, the pressure of the atmosphere is subject to a cyclical variation, coinciding in period with that of the sun-spots; and such that the epoch of maximum pressure corresponds to that of minimum sun-spots and that of minimum pressure to that of maximum sun-spots. When, however, we turn to Western Siberia, we find an oscillation, not less, nay, far more pronounced, and precisely of the opposite character; the maximum of pressure there coinciding with the maximum of sun-spots, and *vice versâ*. The station which exhibits this most prominently, is Ekaterinenburg at the eastern foot of the Oural. But it is also very distinctly recognizable at Bogolowsk to the North, at Slatoust to the South-west, at Barnoul at the northern foot of the Altai, and, as Mr. Archibald pointed out some time since in the pages of 'Nature,' at St. Petersburg. The annual differences at these stations are given in Table IV, and the corresponding curves in the accompanying plate.

TABLE IV.—*Annual variation of barometric pressure in Russia and Western Siberia.*

Years.	Wolf's sun-spot numbers.	St. Petersburgh.	Bogolowsk.	Ekaterinenburg.	Slatoust.	Barnoul.
1847	97·4	+ ·045	— ·034	+ ·022	+ ·097	— ·011
'48	124·9	+ ·044	— ·027	+ ·049	+ ·078	+ ·028
'49	95·4	+ ·003	+ ·053	+ ·011	+ ·033	— ·017
'50	69·8	— ·027	— ·009	+ ·006	+ ·037	+ ·011
'51	63.2	+ ·036	+ ·023	+ ·014	— ·055	+ ·007
'52	52·7	— ·012	— ·012	— ·015	— ·118	+ ·019
'53	38·5	+ ·065	+ ·059	+ ·065	— ·074	+ ·023
'54	21·0	— ·081	— ·034	— ·032	— ·019	— ·013
'55	7·7	+ ·008	— ·003	— ·023	— ·024	— ·013
'56	5·1	— ·104	— ·087	— ·087	— ·069	— ·024
'57	22·9	+ ·064	— ·032	— ·029	+ ·009	— ·040
'58	56·2	— .010	— ·062	— ·045	— ·010	— ·031
'59	90·3	— ·022	— ·016	— ·004	+ ·015	+ .008
'60	94·8	+ ·061	+ ·171	+ ·046	+ ·028	+ ·055
'61	77·7	— ·005	+ ·014	— ·016	— ·021	
'62	61·0	+ ·086	+ ·022	+ ·006	+ ·014	
'63	45·4	— ·049	— ·064	— ·031	— ·023	— ·062
'64	45·2	+ ·021	— ·014	— ·034	+ ·021	+ ·013
'65	31·4	+ ·018	— ·018	— ·056	— ·036	— ·017
'66	14·7	— ·071	— ·004	— ·052	— ·025	+ ·008
'67	8·8	— ·073	— ·052	— ·053	— ·035	— ·003
'68	36·8	— ·017	— ·017	+ ·008	+ ·017	+ ·030
'69	78·6	— ·034	— ·019	+ ·071	+ ·082	+ ·050
'70	131·8	+ ·023	— ·001	+ ·030	+ ·025	+ ·002
'71	113·8	— ·012	— ·029	— ·009	— ·007	— ·011
'72	99·7	+ ·070	+ ·030	+ ·017	?	— ·020
'73	67·7	— ·040	— ·033	— ·038	— ·034	— ·001
'74	43·1	— ·087	+ ·066	+ ·016	— ·060	+ ·019
'75	18·9	+ ·051	+ ·022	— ·007	— .088	+ .003
'76	...	+ ·031	+ ·015	0	— ·080	— ·001
'77	...	+ ·008	+ ·121	+ ·095	+ .010	+ ·098

All these stations, be it observed, are in Western Siberia or European Russia; and it now becomes of interest to ascertain over what area this kind of oscillation obtains. To do this, I have tabulated the barometric data for Tiflis on the South-west, and Nertschinsk and Pekin on the East. No one of these stations exhibits characters resembling those of the stations in Western Siberia; and the curve of Pekin, which is fragmentary, seems rather to exhibit the Indo-Malayan type of variation than that of the Ural stations. Hence, it would seem there is a reciprocal oscillation of atmospheric pressure between Western Siberia and the Indo-Malayan region (perhaps including China) having a period which coincides with that of sun-spot variation; and that Tiflis on the one hand and Nertschinsk on the other lie beyond the limits of its influence.

Now, seeing that the Indo-Malayan barometric maximum of 1876-78 coincided with a portion of the prolonged sun-spot minimum of 1876-79, the facts detailed above would lead us to expect a corresponding deficiency of pressure in Western Siberia. Strange to say, however, this was not the case. The registers of Bogolowsk, Ekaterinenburg, Slatoust, and Barnoul agree in showing a great excess of pressure in 1877, which in the case of Ekaterinenburg was greater than that of any Indian stations, and nearly as great as that of Adelaide. I have not yet received the volume of the 'Annales' for the year 1878; but, on the average of the 20 months from May 1876 to December 1877, it amounted to ·0611." The great excess appears to have been restricted to the stations in Western Siberia. At St. Petersburg, although the pressure was above the average in 1876 and 1877, the excess was far less striking; and that of 1877 was less than that of 1876. At Tiflis, the pressure of the two years was either about the average or below it; and, at Pekin and Nertschinsk, it was not greater than at Shanghai [Zi-ka-wei].

Hence, there prevailed in Asia generally, in 1877, an anomalous (*i. e.*, apparently non-periodic) accumulation of atmospheric pressure, culminating in Western Siberia, and diminishing both to East and West, and also to South. And this seat of maximum lies on the prolongation to the North-west of the Indo-Malayan axis of excessive pressure noticed in the earlier part of this paper. It is at least probable that this anomalous accumulation of pressure extended in a much diminished degree to the Indo-Malayan region, where it was superimposed on the normal periodic excess of that region, and produced a maximum which was more intense than any previously recorded. Also that the excessive pressure of Australia was a phenomenon of the same order as that of Siberia; indeed its southern counterpart. It is at least certain that they exhibit a resemblance in certain not unimportant features to which I shall draw attention in a subsequent paper; merely remarking that, in both cases, these great oscillations of pressure, both periodic and non-periodic, appear to depend mainly, perhaps, indeed, entirely, on the variations of the winter season. Of this, in the case of Ekaterinenburg more especially, the evidence is most striking and convincing, and, as far as I have yet examined the Australian registers, it appears to hold good in their case also.

VII.—*Synopsis of the Species of* Choeradodis, *a remarkable Genus of* Mantodea *common to India and Tropical America.*—*By* J. Wood-Mason, *Officiating Superintendent Indian Museum, and Professor of Comparative Anatomy, Medical College, Calcutta.*

(Received May 1st;—Read June 2nd, 1880.)

The paper of which the following is an abstract, will be published in full as soon as the illustrations which have been drawn on the wood under my supervision and sent to London to be cut are returned to this country.

The remarkable distribution of this genus of *Mantodea* is exactly paralleled by that of another genus of *Orthoptera*, namely *Mastax*, species of which from the southern slopes of the Peruvian Andes have recently been described by Dr. S. H. Scudder.

The nearest allies of *Chœradodis* are the Australian *Orthoderas*, which its young 'larvæ' resemble in the form of the pronotum.

Genus Choeradodis, Serville.

A. Fore femora without a black blotch on the inner side.

1. CHOERADODIS STRUMARIA.

Madame Mérian, Ins. de Surinam, 1726, tab. 27, ♀ et nymph.

Roesel von Rosenhof, Der monatlich-herausgegebenen Insecten Belustigung, 2ter Theil, 1749, Locust. tab. iii, fig. 1 et 2, ♀ et nymph (copied from Mérian).

Mantis strumaria, Linn., Syst. nat. Ins. t. i, pt. ii, 1767, p. 691, no. 13, ♀.

——— ——— Fabr., Ent. Syst. ii, 1793, p. 18, no. 21.

? ——— *cancellata*, Fabr., l. c., 23.

——— ———, Stoll, Spectres et Mantes, pl. xi, fig. 42, ♀.

——— ———, Lichtenstein, Trans. Linn. Soc. Lond. vol. 6, p. 25.

Chœradodis cancellata, Serville, Hist. nat. des Orthopt. 1839, p. 206, ♀.

Craurusa cancellata, Burmeister, Handb. d. Entom. 1839, Band ii, p. 542, (Syn. Serv. et Stoll. fig. 75, exclus.)

Choeradodis cancellata, Saussure, Mant. Americ. p. 19, ♂, ♀.

Hab. Cayenne (♀, *Serville*); Surinam (♀, *Mérian*, *Stoll*; ♂ ♀, *Saussure*).

B. Fore femora with a black blotch on the inner side.

(*a.*) *The blotch on the lower half of the joint* (American).

In the females of the following two species, the posterior angles of the pronotal expansions are broadly rounded and are not produced backwards beyond the level of the hinder end of the primitive pronotum.

2. CHOERADODIS RHOMBICOLLIS.

Mantis rhombicollis, Latr. in Voy. de Humboldt, Zool., Ins. p. 103, pl. 39, figs. 2, 3, ♂.

Choeradodis peruviana, Serville, Hist. nat. des Orthopt. 1839, p. 207, ♂.
——— *strumaria*, Stäl, Syst. Mant., 1877, p. 15, ♂ ♀.

The blotch commences, in both sexes, near the base of the femur, extends through the ungual groove nearly to the middle of the joint, and is there succeeded by a marginal row of black points in contact with the bases of alternate spines.

Hab. ♂ ♀, Guayaquil, in the collection of the British Museum; nymph, Santa Fé de Bogota, in the collection of the Indian Museum, Calcutta; New Granada (♂ ♀, *Stäl*).

3. CHOERADODIS SERVILLEI, n. sp.

♀. Closely allied to the preceding, from which it differs in having the marginal field of the tegmina proportionately narrower, and in the smaller size, as well as in the different shape, of the femoral blotch, which is small and oval, commences just beyond the ungual groove, and is followed by a marginal row of small black points.

Hab. 2 ♀, Cache, Costa Rica, in the collection of Messrs. Godman and Salvin; nymph, Chiriqui, in the collection of the Indian Museum, Calcutta.

In the females of the next two species, and in all probability in those of *Ch. rhomboidea* also, the posterior angles of the pronotal lamellæ are rounded-angulate and produced backwards so that the hinder end of the primitive pronotum projects in the bottom of an angular emargination.

4. CHOERADODIS LATICOLLIS.

Choeradodis laticollis, Serville, Revue p. 24; Hist. nat. des Orthopt. 1839, p. 208, pl. iv, fig. 2, ♀.
——— ——— Saussure, Mantes Americ. p. 20, ♀.
——— *strumaria*, Id., ibid. p. 18, ♂.
——— *laticollis*, Stal, Syst. Mant. 1877, 17, ♀.

The blotch is situated, in both sexes, just beyond the ungual groove, is oblong-rhomboidal in shape, and is followed by two black points on the bases of alternate spines; there is a fuscous speck at the end of the stigmatal spot of the tegmina; and the antero-lateral margins of the pronotal lamellæ are arcuate or convex, especially in the female.

Hab. 5 ♂, 5 ♀, Ecuador (*Buckley*), in the collection of the Indian Museum, Calcutta; Peru (♀, *Stal*); Cayenne (♀, *Serville* et *Stal*); Surinam (♂, *Saussure*).

5. CHOERADODIS STALII, n. sp.

Differs from the preceding in the shape of the blotch (which is pointed at both ends and commences in the ungual groove, and on either side of which the femur is pale luteous-yellow instead of being clouded with fuscous); in being without a fuscous speck at the distal end of the stigma; in its shorter and differently shaped facial shield; and in having the antero-lateral margins and the lateral angles of the pronotal expansions sinuous-concave and more broadly rounded off respectively.

HAB. 1 ♂, 4 ♀, Ecuador *(Buckley)*, in the collection of the Indian Museum, Calcutta.

6. CHOERADODIS RHOMBOIDEA.

Mantis rhomboidea, Stoll, Spectres et Mantes, pl. xi, fig. 45, ♂.

The male insect from Pará, in the British Museum, agrees neither with Saussure's description (*loc. supra cit.* p. 18), nor with any of the specimens in the Indian Museum; it more nearly approaches Stoll's figure, agreeing therewith in the points in which it differs from them.

The blotch commences in the ungual groove, thence extending as far along the femur as in the preceding four species, but it is not followed by a marginal row of black points. The pronotal lamellæ have no posterior angles.

HAB. ♂, Pará, in the collection of the British Museum. A nymph, from Ega, in the same collection, probably also belongs to this species.

This species is nearest allied to *Ch. laticollis.*

(β) *The blotch on the upper half of the joint* (Indian.)

7. CHOERADODIS SQUILLA.

? *Mantis cancellata*, Fabr. Ent. Syst. II, 1793, p. 18.

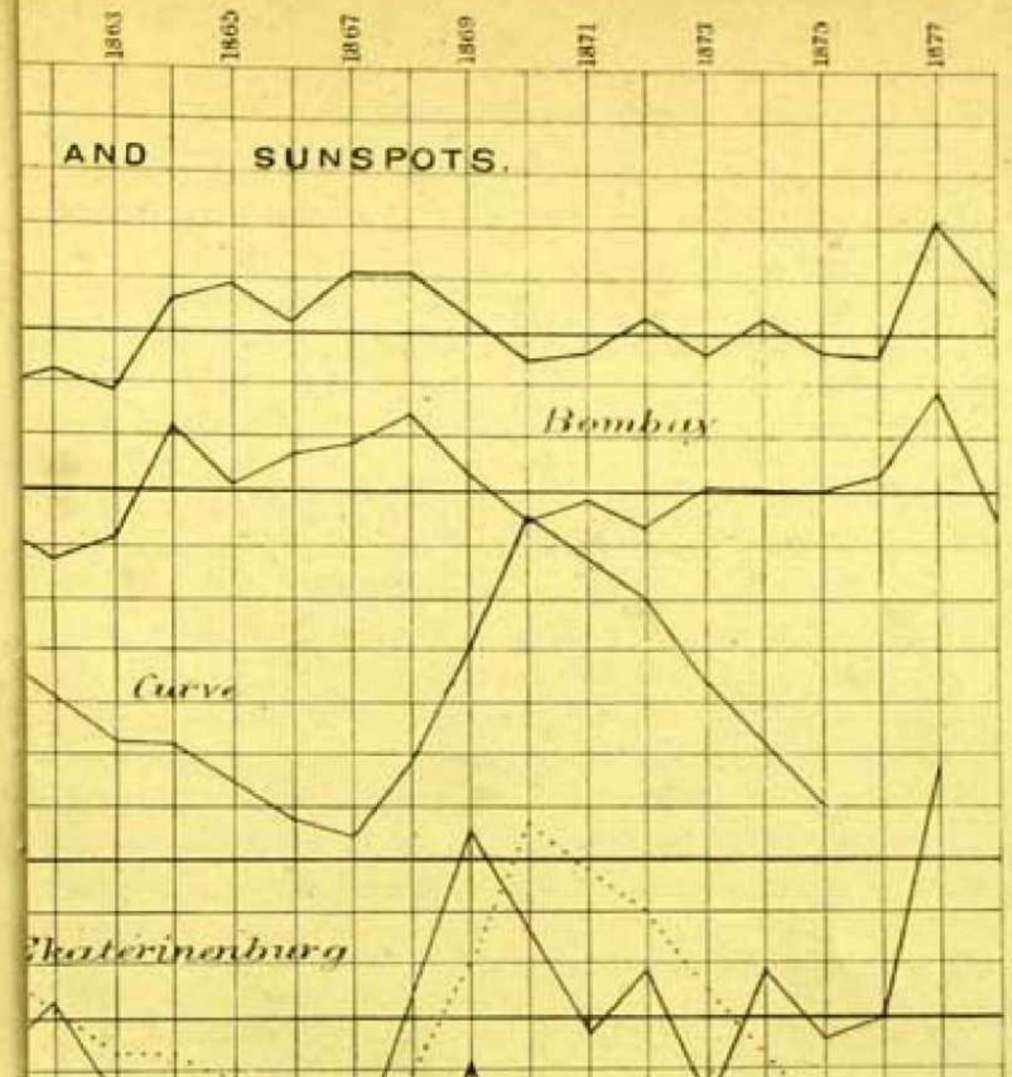
Choeradodis squilla, Saussure, Mél. Orthopt. t. i, 3me fasc. p. 161, pl. iv, figs. 3, 3a, ♂ et nymph.

—— —— Lucas, Ann. Entom. Soc. Fr. 5 sér. t. ii, 1872, p. 32, ♀.

HAB. India generally, from Ceylon (♂ et nymph, *Saussure;* larva, in I. M. Calc.); Madras (♀, *Lucas*); Central India (in coll. Hop. Oxon.); to the banks of the Killing River, in the N. Khasi Hills, on the N. E. Frontier (nymph, *A. W. Chennell*).

Obs. A specimen of this species in the British Museum is erroneously marked "Brazil."

Pl. I.


1863
1865
1867
1869
1871
1873
1875
1877
AND SUNSPOTS.
Bombay
Curve
Ekaterinenburg
Slatoust
Bogolowsk

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☞ Names of new genera and new species have an asterisk (*) prefixed.

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Part II.—PHYSICAL SCIENCE.

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VIII.—*On the past and present Water supplies of Calcutta.—By* ALEXANDER PEDLER, F. I. C., F. C. S., London and Berlin.

At the present day it is I believe universally acknowledged, that every town should be provided with a pure and sufficient supply of water for drinking, domestic and sanitary purposes. If the quantity be not sufficient or if the quality be not good, it may be safely asserted that injury, more or less profound, to the general health of its inhabitants will be the consequence. The very great importance which is attached to the quality and quantity of the water supply of towns, is clear from the prominence which this subject has attained throughout the civilized world during the past few years. In the present paper, it will be my purpose to contrast the nature of the water employed in Calcutta in former years (before the introduction of the present hydrant water) with the supply as it has been since the introduction of the Hooghly water, which is collected and filtered at Pultah, and then distributed by the hydrants, etc. It will be my endeavour to show that the old supply was deficient in quantity, and filthy and abominable in quality, whilst the present supply, though perhaps not so abundant in quantity as it ought to be, is in quality very good and wholesome.

Before proceeding to the discussion of the question of the two supplies, it will perhaps be well to consider what is the general history of natural waters, as this will enable us to understand some of the actual results which have been found by analysis.

The primary form of natural water is rain, and although at first sight it might appear that rain water should be very pure, yet it has been clearly shown* that it is very seldom that such is the case, and that rain water almost always contains, as impurities, small quantities of organic matter, ammonia, and ammonium salts, derived from the atmosphere. In large towns especially, the rain water is so impure, that it cannot be considered a safe water supply for drinking and other domestic purposes. On reaching the ground the water becomes charged to a greater or less extent with the various soluble constituents of the soil, and with any other matters which may have accumulated in it. If it falls on land either cultivated or uncultivated, it rapidly drains off, and finds its way into streams and rivers, which in the earlier parts of their course certainly, will be tolerably free from organic impurity, except that derived from any manure, etc. which may have been on the land. Unless the river water is subsequently rendered impure by the admission of sewage from towns, villages, etc., or by the admission of manufacturing refuse, it will form, generally speaking, a comparatively pure and wholesome supply of water. In some cases, however, such water is used by the inhabitants of towns on its banks, and is after use returned to the river in the form of sewage, which will be charged with impurity derived from animal excreta, household and manufacturing refuse, soap, and other filth. Water contaminated in such a way is clearly unfit for domestic use. After returning to the stream it will perhaps in its course towards the sea become partially purified by slow oxidation of the organic matter and by the absorbent action of vegetation, but as will be subsequently shown this process of purification is an extremely slow one.

In the case of rain water falling in towns such as Calcutta, it will, as pointed out previously, be impure from the presence of organic matter, ammonia, etc.; of this impure water a considerable proportion of it as before shewn will find its way into the river or into smaller streams communicating with it, but another portion will be collected in the tanks, which are dug for this purpose, and a third portion after percolating through the soil will find its way into numerous shallow wells. These tanks and shallow wells may therefore be considered as being merely pits for the accumulation of drainage from the immediately surrounding soil. In the case of Calcutta the town is densely populated, and as the manners and customs of the native inhabitants are in many respects very primitive, the soil must be inevitably charged with excretal and other refuse, so that the water when it reaches the tank or well, will be largely contaminated with the impurities derived from these sources. In the absence of any system of drainage, as was the case in Calcutta some years ago, such tank or well water could only after use be thrown on the surface of the ground, or into the nearest ditch, from which it would either run or percolate into the tank or well a second time, and would naturally be in a still more impure condition. Such would appear to be the natural conclusions as to supplies of water derived from rivers, and from tanks and shallow wells in towns, and it will be subsequently seen that the quality of the Hooghly river water, and of the water of the tanks and wells within Calcutta, as deduced from numerous analyses fully bears out the above suggestions.

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* Angus Smith on Air and Rain.

In speaking of the former supply of water to Calcutta, I have assumed that it was confined to the various tanks and wells distributed throughout the town; for though there is no doubt that the river water was used considerably by the inhabitants who lived near the banks of the river, yet the greater number of the inhabitants living as they did at a distance from the river, must have depended for their supply of household water on the tanks and wells nearest to them. The modern water supply of Calcutta which we have to consider is of course the Hooghly water collected at Pultah and, after filtration, etc., distributed through the ordinary mains.

For the purposes of this paper I have not thought it necessary to analyze all the tank and well waters in the town, which amount to many hundreds, but as I have examined 200 samples, some from the crowded districts of the northern part of the town, and some from the open maidan, I think a fair conclusion can be derived from them. I have also to mention, that a very large number of the well and tank waters which I have analyzed, have been noticeable for their bad quality, and for having apparently given rise to disease of one kind or another to the persons who were living in the neighbourhood. Therefore the numbers usually obtained represent the bad rather than the good waters of the old supply. I should however wish to point out, that there is every probability, that the water in the tanks and wells now, is of a much better quality then formerly it was, for by the present system of drainage and conservancy, a vast amount of excreta and filth of all kinds is removed from the town, which in former days must have remained to choke up the soil, and to render the tank and well water very much more impure than at present.

I will attempt first to shew, that, when the inhabitants of this town depended for their water supply on the tanks and wells, the quantity was decidedly insufficient during at least one half of the year.

With regard to the necessity of a sufficient supply of water being given to a town for domestic and sanitary purposes, a well known author on Hygiene, writes—*

"It was there shown that want of water leads to impurities of all kinds; the person and clothes are not washed, or are washed repeatedly in the same water; cooking water is used scantily, or more than once; habitations become dirty, streets are not cleaned, sewers become clogged; and in these various ways a want of water produces uncleanliness of the very air itself.

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* Parkes' Hygiene, 5th edition, p. 37.

"The result of such a state of things is a general lowered state of health among the population; it has been thought also that some skin diseases—scabies, and the epiphytic affections especially—and ophthalmia in some cases, are thus propagated. It has also appeared to me that the remarkable cessation of spotted typhus among the civilized and cleanly nations, is in part owing, not merely to better ventilation, but to more frequent and thorough washing of clothes.

"The deficiency of water leading to insufficient cleansing of sewers has a great effect on the spread of typhoid fever and of choleraic diarrhœa; and cases have been known in which outbreaks of the latter disease have been arrested by a heavy fall of rain."

In judging of the quantity of water necessary to be supplied to a town, notice must be taken of the purposes for which the water is used. These we may roughly summarise by saying that water is required for drinking, cooking and the washing of persons, clothes, utensils and houses, for the flushing and cleansing of sewers and drains and for the watering of streets, for the drinking and washing of animals, the cleansing of carriages and stables, for trade purposes, etc.

From European statistics given by the authority just quoted, it would appear to be generally admitted, that a fair allowance of water for the purposes above enumerated is 25 gallons per head of population per day. Thus taking some of the largest towns in England and including Paris, each inhabitant receives 27½ gallons per day; the average daily supply of 14 English towns of second rate magnitude was 24 gallons per head, and that of 72 English and Scotch towns was found to be 26·7 gallons per inhabitant.

Let us now see the amount of water available in Calcutta during certain portions of the year when the old supply was depended upon. The tanks and wells in any town can of course only receive their supply of water from rain, and the rainfall of Calcutta is so unequally distributed, that almost three quarters of the whole fall takes place within 4 months of the year, whilst within 6 months, ten-elevenths of the rain falls. Thus the annual rainfall of Calcutta from 49 years' observation, has been found to be 65·85 inches, and during the months from November to April inclusive, only 6·03 inches fall on the average.

If we exclude from our calculation the months of heaviest rainfall, when the water would almost entirely run off into the river and be lost, and assuming for a moment that during these six months from November to April, the whole of the water which fell could be collected and stored for use; then knowing that, according to the last Calcutta Census, the density of the population was 109 persons per acre, it is easy to calculate that each person could receive but 6·8 gallons of *fresh* water daily. In all probability, however, not one-fifth of the rainfall finds its way into these tanks and wells, and this would leave the inhabitants less than 1½ gallons of *fresh* water per day during the hot season of the year. In the Coomartolle Section of the town where the density of the population is 214 per acre, this supply must be reduced to one half or to about three quarters of a gallon of *fresh* water per day.

If even we were to assume, that it was possible to store up the water which fell during the rains, for use during the dry season of the year, and granting as before that one fifth found its way into the tanks and wells, even then each inhabitant of the town could not have had more than 6 or 7 gallons of fresh water daily, and an inhabitant of some parts of the northern division, could not have had more than 3 or 4 gallons.

The conclusion seems to me to be inevitable, that at the time when Calcutta depended for its water supply on its tanks and wells, the inhabitants must have used the same water over and over again though of course without knowing it, not only for such purposes as bathing, washing clothes etc., but probably also for cooking and even for drinking, and it would also appear that there could have been absolutely no water for necessary sanitary measures.

That Calcutta, under these circumstances, should have had a high rate of mortality is scarcely surprising.

I will now endeavour to show that the quality of the old water supply was even less satisfactory than its quantity, and that in a large number of instances of tank and well water, if not in the majority of cases, the water was, and still is, simply sewage, sometimes concentrated, sometimes dilute.

That impure water may be the source of disease is, I believe, now admitted on all hands, and if confirmation were required, abundant evidence to this effect is given in the various reports of the Rivers Pollution Commissioners in England. The researches too of Chauveau, Burdon, Sanderson, Klein and others scarcely leave room for doubt that the specific poisons of the so-called zymotic diseases consist of organized and living matter; and it is now certain that water is the medium through which some at least of these diseases are propagated. There does not appear indeed to be any doubt whatever that such diseases as cholera, typhoid fever, dysentery and diarrhœa may be produced by drinking impure or infected water. An excellent and most conclusive instance of the propagation of typhoid fever by water from one infected case near Basel in Switzerland is admirably described by Dr. Hägler, and is given in the sixth report of the Commissioners above referred to.

It is then evident that, in the analysis of water, the point to be aimed at would be, the detection of the presence of those impurities whether they be of the nature of germs or not, which would give rise to the diseases just mentioned, but unfortunately in the present state of science, we are quite unable even to say with any certainty whether such germs of disease will ever be isolated, and it is therefore clearly out of the power of the chemist to detect their presence in any sample of water. Failing therefore in this endeavour, the chemical analyst has to rest content with the detection and estimation of other substances, such as organic nitrogenous matter etc., which cannot be present in water, unless it has previously been in contact with the various forms of impurity, which we denominate sewage; and if such bodies are present in quantity, it is fair to infer that these germs or other bodies which produce the zymotic diseases, and which are undoubtedly present very frequently in sewage, may also be present in the sample of water. It has also been clearly shown, that in many instances water which is impregnated with animal or vegetable organic matter, even assuming any specific poison to be absent, will give rise to various unpleasant symptoms, such as diarrhœa, etc. It is therefore quite permissible and necessary to condemn any sample of water which is to be used as a potable or domestic supply, if it contains any quantity of organic matter, more especially if the organic matter be of animal origin.

The methods of water analysis have been improved very greatly during the past fifteen years, but even now there is a very warm discussion being carried on as to the respective merits of at least three distinct processes, and opinions differ materially as to which method gives most accurate and reliable results. The two methods for the determination of the amount of organic matter present in water, which have met with the greatest amount of support, are those of Professors Wanklyn and Frankland.

The method proposed by Prof. Wanklyn, which consists in the conversion of the nitrogenous organic matter into ammonia by boiling with an alkaline solution of potassium permanganate, has the immense advantage of being quickly performed with tolerably simple apparatus, and a whole water analysis by this method does not occupy more than a few hours. Against this method there is the well recognized fact, that it sometimes fails to detect and estimate the whole of the nitrogenous organic matter present in the water. It is therefore possible that a water may escape the condemnation which it deserves, but I believe it is generally accepted that a water which is condemned by this process must be really of very bad quality.

The method of analysis which was introduced by Dr. Frankland is an extremely elaborate one, and requires the use of very delicate and expensive apparatus. The greatest drawback to this process is however, the amount of work and time which is required for it, as a satisfactory analysis by it cannot be performed in less than 4 or 5 days. On the other hand the results obtained by Frankland's process are eminently trustworthy, and the character of a water is determined by it with great precision.

As I have been obliged to perform the work of analysis of the tank and well waters of Calcutta during the spare time from my current duties, and as some two hundred analyses had to be made by my own hands, it was clearly impossible for me to use Frankland's more accurate process, and I was compelled rather against my own notions of scientific accuracy to work with Wanklyn's process, which as I have pointed out is not so trustworthy as the other. In addition to this reason, I found that my predecessor in the office of Analyst to the Corporation had been in the habit of testing the Calcutta hydrant water by Wanklyn's process. As I had to carry on this method of analysis on behalf of the Corporation, this therefore formed a very intelligible standard of comparison for my work with the former water supply of Calcutta. In addition however to these analyses of the hydrant water, as will be seen subsequently, I have carried out for the last four years monthly analyses of the hydrant water by Frankland's process, and it is upon these numbers that I shall base my conclusions as to the character and quality of the present water supply.

In Wanklyn's process there are two principal determinations. The first is the estimation of the free ammonia present in the water, and of the albuminoid ammonia obtained by distillation with alkaline potassium permanganate. In India, I have frequently combined these two processes, and the ammonia from both is called the "Total Ammonia." The reason why these two processes have been combined is, that in almost every case when I have tested the *potable* waters of India for free ammonia, I have found it to be almost entirely absent. The fact appears to be, that at the very high temperature which here obtains, the ammonia oxidizes with such extreme rapidity, that if any free ammonia were present at the collection of the water, it would become partially or wholly converted into inorganic nitrogenous matters before the analysis could be performed, or, if the whole of the free ammonia were not thus oxidized, the changes which go on from day to day are so great, that for any true comparison in respect of this constituent between the samples of water analyzed, it would be necessary to analyze them at definite intervals after collection. The "total ammonia" then, which is spoken of subsequently, is the free ammonia present, if any, added to the ammonia produced from the nitrogenous organic matter by the oxidizing action of alkaline potassium permanganate. As pointed out before, it frequently happens that the whole of the nitrogenous organic matter present in the water is not decomposed, and therefore the numbers obtained always represent the minimum amount of impurity which can be present in the water.

Professor Wanklyn says with regard to this method of analysis, that by the aid of the ammonia process, we are now able to divide potable waters into three broad classes:

(1) Waters which are of "extraordinary organic purity," *i. e.*, those which are almost free from any nitrogenous organic matter, and which contain less than 0·05 parts of albuminoid (or total) ammonia per million of water.

(2) "Safe waters," which are devoid of any excess of nitrogenous organic impurity, and which contain from 0·05 to 0·10 parts per million of albuminoid ammonia.

(3) Waters which are "dirty," *i. e.* charged with an abnormal quantity of organic matter, and which contain more than 0·10 parts of albuminoid ammonia per million of water.

The second important consideration is the determination of the amount of chlorine present in the water. Chlorine occurs in potable water in combination with several metals (as chlorides), such as sodium, magnesium, calcium and possibly potassium. The amount of chlorides or of chlorine present in drinking water is in itself of little importance, for as most people are aware, common table salt is simply sodium chloride, and this substance is a necessary ingredient of our food. The water analyst determines the amount of chlorine present in water because the presence of this substance in water is in most instances a clear indication of contamination by sewage in some form or another.

It will be understood how this is the case when we consider that rain water, which is the source of all water supplies when collected in the open country and at inland stations is practically free from chlorine. Drinking water also which is uncontaminated by sewage is comparatively free from this substance, but sewage and urine,* are highly charged with chlorides, of which common salt is probably in largest quantity. If then a given sample of water contains no chlorine or very little, it *cannot* have been in contact with sewage, but if any considerable amount is present in a water, which is known not to have come from a tidal river or from any geological formation where deposits of salt are found, such a water would be viewed with the gravest suspicion, and if this were supported by other evidence, the water would at once be condemned. Unpolluted river and spring waters usually contain less than ten parts of chlorine per million of water, average town sewage in England about one hundred and ten parts; shallow well water may contain any quantity from a mere trace up to 500 parts or even more. The amount of chlorides is scarcely affected by any degree of filtration through soil; thus the effluent water from land irrigated with sewage contains the same proportion of chlorine as the sewage, unless it has been diluted by subsoil water or concentrated by evaporation.

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* Human urine contains about 5000 parts of chlorine per million of liquid.

As an illustration of the quantities of total ammonia and of chlorine as chlorides found in samples of *good* or *fairly good* drinking water, I may quote some numbers taken partly from Prof. Wanklyn's work on water analysis, and partly from other sources such as the Rivers Pollution Commissioners' Reports. The numbers given in the following table show the number of parts of total ammonia and of chlorine in every million parts of the water, and the samples of water it will be seen are selected from a variety of sources, such as lakes, rivers, wells, springs, &c.

DESCRIPTION OF WATER.	Total Ammonia parts per million of water.	Chlorine parts per million of water.
London water, Kent Company, ...	0·03	23·5
" " New River Company, ...	0·08	15·7
Glasgow water from Loch Katrine, ...	0·08	7·6
Edinburgh town water, ...	0·07	14·3
Manchester town water, ...	0·07	9·0
Chester (Dee) town water, ...	0·07	5·0
Oxton (Birkenhead) town water, ...	0·02	
Guildford water, ...	0·01	12·6
Caterham water from deep spring, ...	0·04	15·5
Deep spring at Dorking, ...	0·01	
Deep Well at Chatham, ...	0·06	

As an additional comparison of the quantities of "Total Ammonia" and of Chlorine, which a good potable water should yield, I will quote the amounts of these substances which have been obtained during the last four years from analyses of the Calcutta Hydrant water made twice in each week. In the following table there are given the average results obtained for each of the last four years, as well as the general average for the whole of this period.

Calcutta Hydrant Water.

	No. of days of Analysis.	No. of days when transparent and colorless.*	No. of days when not perfectly filtered.	Total ammonia in parts per million.	Chlorine in parts per million.
Average 1876, ...	155	137	18	0·037	10·65
" 1877, ...	104	72	32	0·046	10·40
" 1878, ...	103	75	28	0·034	8·37
" 1879, ...	103	91	12	0·035	8·50
Sums, ...	465	375	90	0·152	37·92
Average, ...	116	94	22	0·038	9·48

* When examined by transmitted light in a tube three feet in length.

In passing I may here remark, that a comparison of these numbers with those of the previous table, shows that the present water supply of Calcutta is really of excellent quality, and that very few of the *good* waters selected from those given in the works alluded to, are as pure as our hydrant water. That the purity of the hydrant water as determined by this process of analysis is not merely exceptional, is clear from the close agreement of the results of each year with the average of the four years. It will also be noticed that the hydrant water will fall in class one of Prof. Wanklyn's classification, as being a water of extraordinary organic purity.

On the other hand as examples of waters which are considered in England to be exceptionally bad, and which are at once condemned as sources of water for domestic purposes, and as examples of the results obtained from sewage, I may quote the following from Prof. Wanklyn's work on water analysis.

DESCRIPTION OF WATER.	Total ammonia parts per million of water.	Chlorine parts per million of water.
Unfiltered Thames water at Hampton Court, ...	0·32	11·4
,, Thames water at London Bridge, ...	2·11	17·1
Well at Leek Workhouse (Staffordshire), ...	0·36	7·1
Well in Windsor, ...	1·28	80·0
Well in Eton, ...	0·84	80·0
Pump in Drapers Hall, London, ...	6·31	
,, ,, Bishopsgate St., London, ...	7·75	
,, ,, Goodge St., London, ...	......	177·0
,, ,, Oxford Market, ...	......	474·3
Sample of Sewage, ...	17·10	141·4

In addition to these examples I have analysed the Calcutta sewage by the same process. Thus on December 18th, 1877, samples of sewage were collected at each hour from 6 A. M. to 6 P. M. at the Pumping Station, and the amounts of total ammonia obtained from three of the samples showed 84·0, 87·0 and 145·6 parts per million of water. The average amount of chlorine was 170·4 parts in the same volume. This shows a much more concentrated sewage than that analysed by Prof. Wanklyn, but it is fair to state that the three samples of Calcutta sewage were of extreme concentration, and of a most repulsive and disgusting character.

If we take the first two tables above given as representing good drinking waters, and the last as representing sewage, either dilute or concentrated as the case may be, we are now in a position to understand the meaning of the numbers obtained by the analyses of two hundred samples of Calcutta tank and well waters, which are given in the tables below.

I have previously noticed the three standards of purity suggested by Prof. Wanklyn, but as in the case of these Calcutta tank and well waters, we shall be dealing with very impure samples, it will be well to adopt some standards of greater impurity than before given. I think it will be well within the mark to consider, that any sample of water which produces more than 10 parts of total ammonia should be classed as a sewage and not as a water, and that if the amount produced is between 10 and 5 parts, the sample may be called a dilute sewage; from 5 parts to 1 part we have a water considerably contaminated with sewage, and from 1 part down to Prof. Wanklyn's limit of 0·10 parts of total ammonia, we have the class of Dirty Waters, which represent water contaminated more or less with organic or sewage matter. In the same way we may adopt a classification of the amounts of chlorine present, and there is apparently no doubt that a Calcutta tank or well water which contains more than 250 parts of chlorine per million should be classed as a sewage; that a water containing from 250 to 150 parts of chlorine may be looked on as a dilute sewage; that with from 150 to 100 parts of chlorine present we have a water considerably contaminated with sewage; and when from 100 to 50 parts are present a water may be said to be slightly contaminated, whilst if less than 50 parts of chlorine are present, the water may be considered moderately safe.

The first of the two following tables contains the results obtained from the analysis of the tank waters, and the second the numbers obtained from the well waters. The tables contain 9 columns, most of which are explained by their headings. Column 1 gives the date on which the water was analysed, 2 and 3 the locality from which the sample was drawn and the section of the town in which the tank or well is situated. Column 4 gives the reason why my attention was called to the state of the tank or well, and which lead to the water being analysed. Column 5 gives a very brief description of the physical characters of the sample, principally as to colour, smell, presence or absence of solid matters in suspension, presence of animal life etc., and under this head it may be mentioned that as most of the waters were extremely dirty and thick, the examination as to colour was made in a glass cylinder only six inches high standing on a white surface. Columns 6 and 7 give the amounts of total ammonia and of chlorine present in every million parts of water. Column 8 gives the decision as to whether the water was considered fit for potable purposes or whether it was condemned for such uses, and the last column shews whether the tank or well has been subsequently filled up or dewatered.

Most of these results have been submitted to the Health Officer to the Municipality in my capacity of Water Analyst, and it is due to the courtesy of Dr. McLeod that I am able to give the columns 4, 8 and 9.

Tank Waters, 1876.

Date.	Locality.	Section.	Reason why water was submitted to analysis.	Description.	Total Ammonia parts per million.	Amt. of Chlorine parts per million.	Whether condemned for domestic purposes or not.	What was done to the Tank.
March. 1	No. 19, Goa Bagan Street, North Tank.	C	For cholera death in neighbourhood.	Yellowish green color, very turbid. Full of life.	18·52	582·00	Condemned.	Filledup.
"	No. 19, Goa Bagan Street, South Tank.	C	Do.	Yellowish green color, very turbid. Full of life.	26·20	639·00	Do.	
" 16	Name of locality not clearly ascertained.		Do. and complaint.	Greenish color. Full of animal life.	24·80	568·00	Do.	
" 24	Nihareeparah.	A	Filthy state.	Green color, unpleasant smell, suspended matter.	18·00	550·25	Do.	
" 27	Nundoram Sen's Street.	B	Do.	Brown white color. Very turbid, Full of life.	10·00	390·50	Do.	Filledup.
" 28	Krupanauth's Lane.	B	Do.	Tolerably clear. Full of life.	2·40	443·75	Do.	
" 29	Boloram Ghose's Street.	A	Do.	Greenish color, very turbid. Full of life.	2·00	514·75	Do.	Filledup.
" 30	Raja Rajbullub Street.	A	Do.	Rather clear; small floating worms.	2·00	514·75	Do.	Filledup.
April 20.	Bortollah Tank.	C	Cholera death in neighbourhood.	Yellowish white color, turbid, contains animal life.	2·20	255·60	Do.	Filling.
May 2.	7, Grey Street.	C	Filthy state.	Yellowish green color, stinks horribly, full of suspended matter and animal life.	20·00	710·00	Do.	Filledup.
" 3.	Kerr's Lane.	M	Do.	Green color, stinks horribly, full of sediment, animal life	13·75	319·50	Do.	Do.
" 9.	141, Dhurrumtollah Street.	K	Do.	Whitish green color, rather strong stink, full of animal life.	9·60	266·25	Do.	Do.
" 10.	102, Jaun Bazar Street.	N	Do.	Green color, stinks horribly, full of life, animal and vegetable.	9·60	284·00	Do.	
Aug. 15.	Presidency Jail Tank.	Q	Do.	Of greenish color, slightly turbid.	1·30	46·15	Do.	
"	Alipore Jail Tank.		Do.	Yellowish color, slightly turbid.	0·68	35·50		Filledup.
Sept. 19.	Sookea's St. Thana, North Tank.	D	Do.	Brownish color, contains suspended matter and considerable amount of animal life.	1·62	184·60	Do.	
"	Sookea's St. Thana, South Tank.	D	Cholera death in neighbourhood.	Almost colorless, contains suspended matter, little if any animal life visible.	·35	142·00	Do.	Filling.
Dec. 16.	Komadan Bagan, Double Tank.	N	Do.	Slight greenish color, faint smell, turbid, full of animal life.	2·40	266·25	Do.	
"	Tank Haree Tollowa.	N	Do.	Greenish white color, very unpleasant smell, very turbid, full of animal life.	7·65	372·75	Do.	
" 22.	D Tank Water.			Of a whitish color, turbid, contains animal life, but apparently not in large quantity.	0·60	31·95		

Tank Waters, 1877.

Date.	Locality.	Section.	Reason why water was submitted to analysis.	Description.	Total Ammonia parts per million.	Amt. of Chlorine parts per million.	Whether condemned for domestic purposes or not.	What was done to the Tank.
Jan. 9.	Godai Khansama's Lane, Colinga.	O	Filthy state.	Greenish white color, turbid, and full of animal life.	3·06	156·20	Condemned.	De-watered.
,, 12.	Gopal Mitter's Tank in Brindabun Mullick's Lane.	D	Cholera death in neighbourhood.	Of a greenish color, turbid, and full of animal life.	2·52	475·70	Do.	
,, 16.	Dhankhit Tank, Colvin's Bustee.	Q	Filthy state.	Of a whitish color, turbid, and full of animal life.	16·00	170·40	Do.	
Feb. 13.	74, Dhurumtollah Street.	B	Complaint of do.	Of a whitish color, and turbid.	14·80	195·25	Do.	
,, 23.	Tolley's Nullah.	R	Filthy state.	Of a whitish color, and turbid.	·10	71·00		
,,	Hastings Bridge, (foot of).	R	Do.	Of a whitish color, and turbid.	·10	65·67		
Mar. 6.	Tolley's Nullah taken between High water and mid ebb-tide.	R	Do.	Of a whitish color, and turbid.	·08	22·36		
,, 12.	31, Neogipuker East Lane.	N	Cholera death in neighbourhood.	Green color, stinks horribly, turbid, full of green suspended matter.	8·00	230·75	Do.	No. 30, Filled up.
,, 13.	42, Hareepara Lane.	N	Do.	Whitish brown color, smells badly, very turbid.	61·28	355·00	Do.	Filled up.
,, 14.	62, Lower Circular Road.	N	Do.	Green color, suspended matter, stinks, turbid, full of animal life.	47·04	230·75	Do.	Do.
,, 15.	32, Neogipuker East Lane.	N	Do.	Green color, suspended matter, stinks, turbid.	24·00	142·00	Do.	No. 33, Filled up.
,, 16.	30, Hareepara Lane.	N	Filthy state.	Brownish color, faint smell, slightly turbid.	24·00	230·75	Do.	Filled up.
,, 17.	16, Neogipuker W. Lane.	N	Do.	Greenish white color, faint odour, very turbid, green suspended matter.	120·00	337·25	Do.	
,, 18.	19, Okur Dutt's Lane.	K	Cholera death in neighbourhood.	Greenish white color, faint smell, turbid.	12·84	159·75	Do.	Filled up.
,, 19.	18, Holodhur Buddan's Lane.	K	Filthy state.	Brown almost black color, stinks, very turbid, full suspended matter.	40·80	319·50	Do.	
,, 20.	15, Takoor Doss Paulit's L.	K	Do.	Brownish white color, stinks, excessively turbid.	16·00	248·50	Do.	

Tank Waters, 1877—*Continued.*

Date.	Locality.	Section.	Reason why water was submitted to analysis.	Description.	Total Ammonia parts per million.	Amt. of Chlorine parts per million.	Whether condemned for domestic purposes or not.	What was done to the Tank.
Mar. 20.	10, Okur Dutt's Lane.	K	For Cholera death in neighbourhood.	Brownish or blackish white color, stinks, excessively turbid.	24·00	266·25	Condemned.	Filled up.
"	15, Ooriahpara Lane.	K	Do.	Do. Do. Do.	60·00	355·00	Do.	
" 21.	16, Cornwallis Street.	D	Do.	Greenish white color, stinks, turbid.	16·00	159·75	Do.	
"	22, Sunkur Ghose's Lane.	D	Do.	Brownish white color, smells, slightly turbid.	16·00	284·00	Do.	
" 22.	36, Sankaritollah Lane.	K	Do.	Brownish white color, stinks, excessively turbid.	16·16	408·25	Do.	
"	103 & 104, Serpentine Lane.	K	Do.	Greenish brown, stinks horribly, excessively turbid.	240·00	319·50	Do.	
" 23.	2 & 3, Holodhur Buddan's Lane.	K	Do.	Brownish white color, slightly turbid, little suspended matter.	8·40	230·75	Do.	
"	21, Jalliapara Lane.	K	Do.	Almost transparent, little suspended matter.	200·00	159·75	Do.	
" 25.	8, Ukur Dutt's Lane.	K	Do.	Brownish color, smells, turbid.	1·80	479·25	Do.	
"	8, Kisto Laha's Lane.	K	Complaint.	Stinks horribly, excessively turbid, full of bright green suspended matter.	26·40	426·00	Do.	
" 26.	9, Sepentine Lane.	K	Cholera death.	Whitish green color, stinks, very turbid.	8·00	355·00	Do.	
"	90, Chitpore Road.	G	On H. O.'s report.	Yellowish brown color, no smell, slightly turbid with suspended matter.	0·48	117·00	Do.	
" 28.	7, Grey Street.	C	For Cholera death in neighbourhood.	Yellowish brown color, smells, opalescent, little suspended matter.	16·00	461·50	Do.	Filled up.
"	115, Upper Chitpore Road.	G	Do.	Brownish color, smells, opalescent, suspended and animal matter.	8·00	266·25	Do.	
" 29.	22, Musjeedbarree Street.	C	Do.	Bright green color, stinks horribly, extremely opalescent, suspended matter.	19·84	390·50	Do.	
" 30.	63, Hurry Ghose's Street.	C	Do.	Brownish almost black color, stinks, suspended matter.	12·60	248·50	Do.	
"	5, Fukeer Chand Chatterjee's Street.	C	Do.	Brown color, stinks horribly, extremely opalescent, much suspended matter.	28·56	585·75	Do.	
" 31.	27, Taruk Chatterjee's Lane.	C	Do.	Brown color, smells, opalescent, suspended matter.	20·00	301·75	Do.	
"	31, Durjeeparah Street.	C	Do.	Yellow color, smells, suspended matter.	8·00	390·50	Do.	

April 10.	28, Goa Bagan W. Goallapara.	C	Complaint of raging cholera.	Greenish black color, stinks, opalescent, full of suspended matter.	6·40	426·00	Condemned.	
„	16, Do. Do.	C	Do.	Bright green color, stinks, excessively opalescent, full of suspended matter.	20·96	337·25	Do.	
„ 12.	Double Tank, Komadar Bagan, Joratolla.	O	Foul state.	Greenish white color, stinks, with much suspended matter and animal matter.	3·90	177·50	Do.	Nos 19 4 and 96 filled up.
„	99, Jaun Bazar Street.	N	Do.	Yellowish color, unpleasant smell, slightly turbid, suspended matter & also animal life.	7·20	124·25	Do.	
„ 16.	Tank A.		Do.	Almost colorless and smells unpleasantly; much suspended matter.	Lost.	74·50		
„	Tank B.		Do.	Stinks of sulphuretted hydrogen, becomes opalescent on exposure, much suspended matter.	3·20	81·60	Do.	
Aug. 7.	75 & 76, South Colinga St.	O	Foul state.	Yellow color, smells slightly, contains suspended matter.	2·36	159·75	Do.	No. 74, dewatered Filled up.
„ 10.	24, Baranosee Ghose's St., Singhee Bagan.	F	Cholera death in neighbourhood.	Almost colorless, faint unpleasant smell, and suspended matter, much animal life.	2·68	142·00	Do.	
„ 28.	29, Neogipukur East Lane.	N	Do.	Water of a yellowish color, faint unpleasant smell, much animal life.	2·64	276·90	Do.	
Oct. 9.	10 & 12, Elliot's Road.	O	Do.	Yellowish color, stinks, opalescent, contains animal life.	4·29	71·00	Do.	Filled up.
„ 10.	6, Hill's Lane.	O	Complaint.	Yellowish color, smells slightly, slightly opalescent, animal life.	3·95	142·00	Do.	
„ 26.	62, Machooa Bazar Street.	I	Cholera death in neighbourhood.	Greenish white color, stinks badly, full of suspended matter and animal matter.	4·40	213·00	Do.	Filled up.
„ 27.	44, Musjeedbarry Street.	C	Filthy state.	Yellowish green color, stinks, some suspended matter, animal life.	2·59	266·25	Do.	
„ 30.	38, Nilmoney Mitter's St.	C	Complaint.	Greenish brown color, stinks, suspended matter, animal life.	9·00	301·75	Do.	Filled up.
Nov. 2.	7, Sookea's St., Bye-Lane.	D	Cholera death in neighbourhood.	Yellowish green color, slight smell, slightly opalescent, small quantity suspended matter, full of animal life.	3·40	185·25	Do.	
„ 3.	11, Carey's Church Lane.	I	On Tank Committee's report.	Brownish white color, unpleasant smell, slightly opalescent, small quantity suspended matter, full of animal life.	12·00	185·25	Do.	

Tank Waters, 1877—*Concluded.*

Date.	Locality.	Section.	Reason why water was submitted to analysis.	Description.	Total Ammonia parts per million.	Amt. of Cholerine parts per million.	Whether condemned for domestic purposes or not.	What was done to the Tank.
Nov. 8.	Colvin Bustee Tank.	Q	Cholera death in neighbourhood.	Greenish white color, stinks, opalescent, full of green suspended matter and animal life.	13·00	195·25	Condemned.	
,, 10.	9, Shampuker Street.	A	Do.	Greenish color, slight smell, slightly opalescent, full of green suspended matter and animal life.	9·84	181·05	Do.	
,, 11.	85, Machooa Bazar Street.	D	Do.	Yellowish brown color, slight smell, opalescent, full animal life.	11·30	159·75	Do.	
,, 12.	6, Emambaug 2nd Lane.	J	Complaint.	Green color, faint smell, much suspended matter, and animal life.	3·00	113·60	Do.	
,, 13.	75, Jaun Bazar Street.	N	Cholera in neighbourhood.	Greenish yellow color, stinks, rather opalescent, small quantity of suspended matter, full of animal life.	2·76	202·35	Do.	
Dec. 10.	46, Kally Prosad Dutt's St.	C	Do.	Dark green brown color, on being kept a few days stinks horribly, full of green suspended matter, and animal life.	28·56	205·90	Do.	No. 54, Filled up.
,, 11.	104, Upper Circular Road.	C	Do.	Whitish brown color, when kept a few days has a very bad smell, full of green suspended matter, contains animal life.	23·52	262·70	Do.	
,,	12, Nuzur Nuzubullah's Lane.	[illegible]	On the report of Tank Committee.	Greenish white color, has unpleasant smell, moderate amount of suspended matter, much animal life.	8·40	181·05	Do.	
,, 18.	18, Hareepara Lane, and 15, Neogipuker West Lane.	N	Filthy state.	Green color, stinks most horribly, much suspended matter, full of animal life.	11·16	244·95	Do.	Filled up.

Tank Waters, 1878.

Date.	Locality.	Section.	Reason why water was submitted to analysis.	Description.	Total Ammonia parts per million.	Chlorine parts per million.	Whether condemned for domestic purposes or not.	What was done to the Tank.
Jan. 2.	54, Raja Rajbullub Street.	A	Cholera death in neighbourhood.	Deep yellowish color, very unpleasant smell, full of suspended matter and animal life.	21·30	475·70	Condemned.	
" 7.	3, Fukeer Chand Mitter's Lane.	D	Do.	Yellowish green color, unpleasant smell, little suspended matter, contains animal life.	3·46	92·30	Do.	
" 8.	129, Cornwallis Street.	C	Do.	Bright green color, stinks, much suspended matter, much animal life.	21·06	280·45	Do.	No. 30, Filled up.
" 9.	4, Fukeer Chand Mitter's Lane.	D	Do.	Water yellowish color, some suspended matter.	12·00	149·10	Do.	
" 10.	21, Do. Do. Do.	D	Do.	Yellowish green color, unpleasant smell, slightly opalescent, little suspended matter, animal life.	4·70	127·80	Do.	
" 19.	81, Shampookur Street.	A	Do.	Yellow color, slight smell, little suspended matter, much animal life.	2·72	142·00	Do.	
" 30.	27, Noyau Chunder Dutt's Lane.	C	Do.	Yellow, stinks, small quantity suspended matter, no visible animal life.	1·47	124·25	Do.	
"	Karbala tank water.	C	Do.	Has a brown color, unpleasant smell, contains suspended matter, animal life.	1·49	276·90	Do.	
Feb. 27.	162, Bow Bazar.	I	Do.	Yellow brown color, stinks, opalescent, much suspended matter, no life.	40·66	266·25	Do.	
"	1, Nemoo Gosain's Lane.	B	Do.	Brown color, stinks badly of sulphuretted hydrogen, opalescent, much suspended matter, animal life.	23·20	479·25	Do.	
Mar. 5.	Jinghu Bagan.	J	Do.	Green yellow color, stinks horribly of sulphuretted hydrogen, opalescent, much suspended matter.	11·50	408·25	Do.	
" 8.	2, Manicktollah Street.	J	Do.	Brownish color, stinks, very opalescent, much suspended matter, animal life.	38·74	461·50	Do.	

Tank Waters, 1878—Continued.

Date.	Locality.	Section.	Reason why water was submitted to analysis.	Description.	Total Ammonia parts per million.	Chlorine parts per million.	Whether condemned for domestic purposes or not.	What was done to the tank.
Mar. 11.	222, Cornwallis Street.	J	Cholera death in neighbourhood.	Greenish color, stinks, very opalescent, animal life.	3·52	248·50	Do.	
"	26, Prossunno Coomar Tagore's Street.	E	Do.	Bright green color, stinks horribly, very opalescent, full of green suspended matter, full of animal life.	17·00	319·50	Do.	
" 12.	22, Hero Lall Mitter's Street.	A	Do.	Brownish color, bad smell, very opalescent, small quantity suspended matter, animal life.	7·68	301·75	Do.	
" 13.	45, Shampookur Lane.	A	Complaint.	Yellowish white color, stinks, large quantity suspended matter, visible animal life.	3·02	230·75	Do.	
"	54, Old Boytuckhanah Bazar Street.	I	Cholera death in neighbourhood.	Brown color, stinks, much suspended matter, much animal life.	42·66	355·00	Do.	
" 26.	Mirzapore Public Tank.	I	Do.	Greenish color, faint smell, small quantity suspended matter, animal life.	1·31	102·95	Do.	
"	Badoorbagan Tank, 83, Upper Circular Road.	D	Do.	Greenish color, stinks, green suspended matter in large quantity, animal matter in quantity.	2·16	220·10	Do.	
April 27.	Dhurumtollah Public Tank.	M			0·80	24·80		
May 10.	Wellesley Street.	M		Yellow color, slight smell, small quantity suspended matter.	0·34	147·68		
"	Palmer's Bridge.	R		Yellowish brown, slight smell of sulphuretted hydrogen, much suspended matter.	0·17	2378·5	Do.	

Tank Waters, 1879.

Date.	Locality.	Section.	Reason why water was submitted to analysis.	Description.	Total Ammonia parts per million of water.	Chlorine parts per million of water.	Whether condemned for domestic purposes or not.	What was done to the tank.
Jan. 22.	82, Upper Circular Road.	N	Cholera death in neighbourhood.	Blackish green color, very bad smell, suspended matter, contains animal life.	2·68	248·50	Condemned.	
,, 22.	83, Upper Circular Road.	N	Do.	Yellow color, stinks badly, much suspended matter, contains animal life.	9·00	213·00	Do.	
June 20.	Rawdon Street.	Q		Yellowish color, slight odour, small quantity of suspended matter, animal life in small quantity.	4·20	269·80	Do.	
July 4.	36, Goorooprosad Chaudry's Lane.	D	Do.	Blackish color, stinks abominably, much suspended matter.	1·98	209·45	Do.	
,, 5.	22, Durga Churn Mukerjea's Street.	A	Do.	Brownish color, stinks badly, much suspended matter.	3·72	213·00	Do.	
,, 7.	4, Brindabun Mullick's Lane.	D	Do.	Brownish color, bad smell, opalescent, small quantity of suspended matter.	7·20	223·65	Do.	
Oct. 10.	5, Peary Mohun Paul's Lane.	H	Complaint.	Brownish black color, unpleasant smell, very opalescent, large quantity of suspended matter.	92·40	177·50	Do.	
,, 11.	10 and 11, Jorapukor Lane.	F	Cholera.	Blackish brown color, stinks badly, very opalescent, large quantity of suspended matter.	77·60	177·50	Do.	
,, 14.	160, Gokul Mitter's Lane, Baug Bazar.	A	Complaint.	Brown color, stinks abominably, very opalescent, large quantity of suspended matter.	11·52	248·50	Do.	
				1880.				
Jan. 24.	No. 19, Goa Bagan Street.	C	Cholera.	Grey color, slight odour, much suspended matter, much animal life.	13·86	319·50	Do.	Filled up.

Tank Waters, 1880—*Continued.*

Date.	Locality.	Section.	Reason why water was submitted to analysis.	Description.	Total Ammonia parts per million of water.	Chlorine parts per million of water.	Whether condemned for domestic purposes or not.	What was done to the tank.
Jan. 24.	32, Elliott's Road.	O	Prevalence of Swelling fever.	Grey color, unpleasant odour, much suspended matter, much animal life.	15·20	195·25	Condemned.	
„ 26.	31, Elliott's Road.	O	Do.	Green color, slight odour, much green suspended matter, animal life.	4·00	159·75	Do.	
„ 28.	35, Elliott's Road.	O	Do.	Green color, stinks abominably, much suspended matter, animal life.	6·00	142·00	Do.	
„ 29.	11, Mohendra Gossain's Lane.	F	Complaint.	Bright yellow color, unpleasant smell, suspended matter, much animal life.	23·20	337·25	Do.	
„ 30.	Radhanath Bose's Lane.	C	Do.	Green color, unpleasant smell, suspended matter, much animal life.	6·30	355·00	Do.	
May 29.	31, Bachoo Chatterjea's Street.	D	Do.	Green color, stinks badly, very turbid, suspended matter, animal life.	8·00	401·15	Do.	
July 5.	South of Park Street old Cemetery.			Slight yellow color, no smell, almost clear and transparent, small quantity of animal life.	0·16	255·60		
„ 6.	Birju Tank, south of Cathedral.	Maidan.		Greyish color, no smell, rather turbid, small quantity of animal life.	0·09	13·84		
„ 7.	Elliot's Tank, north of Cathedral.			Slight greyish color, no smell, rather turbid, small quantity of animal life.	0·10	8·16		
„ 8.	General's Tank opposite Bengal Club.			Grey color, no smell, rather turbid, small quantity of animal life.	0·10	32·66		
„ 9.	Monohar Dass's Tank opposite Lindsay Street.			Almost colorless, no smell, almost clear and transparent, very small quantity of animal life.	0·07	16·68		
„ 10.	Tank opposite Esplanade.			Almost colorless, no smell, almost transparent, small quantity of animal life.	0·11	24·14		

Well Waters, 1877.

Date.	Locality.	Section.	Reason why water was submitted to analysis.	Description.	Total Ammonia parts per million.	Amt. of Chlorine parts per million.	Whether condemned for domestic purposes or not.	What was done to the well.
May 8.	5, Jorabagan.	E	Cholera death in neighbourhood.	Greenish black color, stinks horribly, slightly opalescent, full of suspended matter.	1·68	177·50	Condemned.	
" 9.	1, Horo Lall Doss's Lane.	E	Filthy state.	Slight brownish color, no smell, little suspended matter.	0·80	248·50	Do.	
" 10.	16, Burrabazar Moydaputty.	G	Do.	Almost colorless, no suspended matter.	0·40	213·00	Do.	
" 11.	Jaunbazar Bustee.	M		Yellowish color, no smell, traces of suspended matter.	8·20	514·75	Do.	
" 12.	24, Jorabagan Street.	E	Filthy state.	Almost colorless, faint smell, small amount of suspended matter.	0·62	621·25	Do.	
" 13.	6, Jorabagan Street.	E	Do.	Brownish color, faint smell, small amount of suspended matter.	0·50	248·50	Do.	
" 14.	7, Horo Lall Doss's Bustee.	E	Do.	Brownish color, nasty smell, opalescent, suspended matter.	1·76	142·00	Do.	
" 15.	9, Shama Bye's Gully.	E	Do.	Slight yellowish color, faint smell, small amount of suspended matter.	0·90	426·00	Do.	
" 16.	30, Burtollah Street.	E	Do.	Almost colorless, faint smell, small amount of suspended matter.	0·50	39·50		
" 17.	9, Burrabazar Baneaputty.	G	Do.	Brownish color, faint smell, suspended matter.	0·40	177·50	Do.	
"	145, " Hookaputty.	G		Yellowish color, faint smell, much suspended matter.	0·30	710·00	Do.	
" 18.	3, Hanspookur Gully.	E	Filthy state.	Strong yellowish brown color, faint smell, much suspended matter.	4·15	307·70	Do.	
" 19.	159, Machooa Bazar Street.	E		Yellowish color, faint unpleasant smell, little suspended matter.	2·40	390·50	Do.	
Aug. 10.	145, Burra Bazar.	G	Filthy state.	Almost colorless, faint unpleasant smell, suspended matter.	3·68	791·65	Do.	

Well Waters, 1877—*Continued.*

Date.	Locality.	Section.	Reason why water was submitted to analysis.	Description.	Total Ammonia parts per million.	Amt. of Chlorine parts per million.	Whether condemned for domestic purposes or not.	What was done to the well.
Aug. 10.	24, Jorabagan Street.	E	Cholera death in neighbourhood.	Yellowish green color, faint unpleasant smell, suspended matter, animal life distinct.	2·84	265·25	Condemned.	
" 11.	3, Hanspookur Lane.	E		Almost colorless, faint smell, small quantity suspended matter.	1·42	390·50	Do.	
" 12.	6, Jorabagan Street.	E	Cholera death.	Yellowish color, faint unpleasant smell, small quantity suspended matter, distinct animal life.	3·76	159·75	Do.	
" 13.	30, Burtolah Street.	E		Colorless, faint unpleasant smell, large quantity of suspended matter, distinct animal life.	2·73	319·50	Do.	
" 14.	9, Shama Bay's Lane.	E		Almost colorless, faint unpleasant smell, small quantity suspended matter.	2·64	408·50	Do.	
" 15.	24, Bustee Joraban Street.	E		Brown color, stinks badly, very opalescent, much suspended matter, distinct animal life.	17·40	159·75	Do.	
" 16.	1, Horo Lall Doss's Lane.	E		Almost colorless, faint smell, small quantity of suspended matter.	3·95	177·50	Do.	
" 17.	16, Burra Bazar Moydaputty.	G		Colorless, faint unpleasant smell, little suspended matter.	2·83	177·50	Do.	
" 18.	5, Jorabagan Street.	E	Cholera death.	Whitish yellow color, smells unpleasantly, opalescent, suspended matter, and traces of animal life.	15·80	88·75	Do,	
" 19.	9, Burrabazar Baneaputty.	G		Almost colorless, faint unpleasant smell, suspended matter, animal life.	3·28	195·25	Do.	
" 20.	Bustee Horo Lall Doss's Lane.	E		Yellow color, decided unpleasant smell, suspended matter.	4·32	248·50	Do.	
" 22.	136, Serpentine Lane.	K		Yellow color, unpleasant smell, little suspended matter, much animal life.	6·40	621·25	Do.	

Well Waters, 1878.

Date.	Locality.	Section.	Reason why water was submitted to analysis.	Description.	Total Ammonia parts per million.	Chlorine parts per million.	Whether condemned for domestic purposes or not.	What was done to the well.
Jan. 28.	Doorga Churn Mittur's Street.	C	Cholera death in neighbourhood.	Almost colorless, but in long cylinder appears yellowish, faint unpleasant smell, small quantity suspended matter, no animal life perceptible.	1·40	88·75	Condemned.	
" 30.	13-A, Nattur Bagan.	B	Do.	Almost black, unpleasant smell, excessively turbid, animal life.	51·50	841·35	Do.	
Feb. 7.	13-B, Nattur Bagan.	B	Do.	Slight brownish tinge, slight smell, small quantity suspended matter, no visible animal life.	3·30	639·00	Do.	
"	14, Smith's Lane.	N	Do.	Yellow color, slight smell, some suspended matter, small traces of animal life.	3·30	479·25	Do.	
"	30, Noyau Chaund Dutt's Street.	C	Do.	Yellow color, unpleasant smell, small quantity suspended matter, distinct animal life.	1·92	152·65	Do.	
" 15.	10, Ram Kanto Bose's Lane.	A	Do.	Yellowish color, unpleasant smell, moderate amount suspended matter, no visible animal life.	12·80	582·20	Do.	
" 19.	Railway Tank, Sealdah.		Do.	Almost colorless, slight smell, small quantity suspended matter, no visible animal life.	0·80	452·60	Do.	
" 20.	128-J, Bow Bazar Street.	K	Do.	Almost colorless, no smell, very small quantity suspended matter, no visible animal life.	0·60	450·85	Do.	
" 22.	20, Bamutollah Street.	B	Do.	Yellow color, unpleasant smell, much suspended matter, animal life.	48·00	816·50	Do.	
" 25.	34, Serang's Lane.	N	Do.	Almost colorless, slight smell, small quantity suspended matter, no visible animal life.	0·94	603·50	Do.	
" 28.	1-D, Nemoo Gawsat's Lane.	B	Do.	Yellow color, unpleasant smell, much suspended matter, no visible animal life.	17·52	514·75	Do.	Filled up.

Well Waters, 1878—*Continued.*

Date.	Locality.	Section.	Reason why water was submitted to analysis.	Description.	Total Ammonia parts per million.	Chlorine parts per million.	Whether condemned for domestic purposes or not.	What was done to the well.
Feb. 28.	13-J, Patwai Bagan.	I	Cholera death in neighbourhood.	Yellowish color, slight smell, small quantity of suspended matter, no visible animal life.	0·94	603·50	Condemned.	
„	21, Nathu Bagan.	B	Do.	Brownish color, unpleasant smell, slightly opalescent, small quantity suspended matter.	41·06	532·50	Do.	
„	1, Nemoo Gosain's Lane.	B	Do.	Brownish color, stinks, suspended matter, and much animal life.	6·96	390·50	Do.	
Mar. 4.	71, Dhurumtollah Street.	B	Do.	Yellow color, slight smell, small quantity suspended matter, no animal life.	3·36	319·50	Do.	
„	9, Boloram Mozoomdar's Street.	B	Do.	Black color, horrible stench of sulphuretted hydrogen, very opalescent, much suspended matter.	11·17	492·00	Do.	
„ 7.	168, Cotton Street.	E	Do.	Slight yellowish tinge, slight smell, little suspended matter.	0·20	195·25		
„	113, Dhurumtollah Street.	E	Do.	No smell, small quantity suspended matter, no visible animal life.	2·50	53·25	Do.	
„	82-5, Burtollah Street.	E	Do.	Full yellow color, slight smell, much suspended matter, distinct animal life visible under microscope.	222·00	781·00	Do.	
„ 8.	27, Bonomally Sircar's Street.	B	Do.	Almost colorless, very slight smell, little suspended matter, distinct animal life under microscope.	18·60	319·50	Do.	
„ 5.	23-9, Durponaryan's Lane.	E	Do.	Almost colorless, very slight smell, much suspended matter, no visible animal life.	14·80	514·75	Do.	
„	17-22, Durponaryan's Tagor's Street.	E	Do.	Slight yellowish color, very slight smell, little suspended matter, no animal life.	2·00	284·00	Do.	
„ 5.	3, Antony Bagan Lane.	I	Do.	Yellowish color, no smell, little suspended matter.	9·48	230·75	Do.	

Mar. 5,	25, Baranosee Ghose's Street.	F	Cholera death in neighbourhood.	Greyish white color, stinks badly, very opalescent, much suspended matter.	1·92	71·00	Condemned.
„ 6.	7-a, Bysack's Lane.	E	Do.	Deep brown color, unpleasant smell, opalescent.	219·00	1384·5	Do.
„	124, Manicktollah Street.	D	Do.	Yellow color, stinks badly, little suspended matter, no animal life.	35·74	727·75	Do.
„ 8.	21, Machoo Pal's Street.	B	Do.	Almost clear, transparent and colorless, no smell, no visible animal life.	5·24	213·00	Do.
„ 11.	6, Ashutosh Dey's Lane.	F	Do.	Colorless, slight smell, little suspended matter, no visible animal life.	9·96	319·50	Do.
„	5, Suri's Lane.	K	Do.	Blackish color, stinks badly, very opalescent, full of suspended matter, animal life.	68·00	550·25	Do.
„	12, Nilmony Mitter's Lane.	C	Do.	Almost colorless, very slight smell, little suspended matter, no animal life.	8·52	426·00	Do.
„ 12.	82-17, Burtollah Street.	E	Do	Almost colorless, slight smell, small quantity suspended matter.	0·46	126025	Do.
„	14-C, Goomgur Lane.	G	Do.	Yellowish color, nasty smell, little suspended matter.	3 31	727·75	Do.
„	222, Cornwallis Street.	F	Do.	Yellowish color, very unpleasant smell, little suspended matter, animal life.	5·68	177·50	Do.
„	1, Ram Chunder Banerjee's Lane.	I	Do.	Almost colorless and transparent, very little suspended matter.	0·60	35·50	
„ 13.	22, Free School Street.	M	Do.	Greenish yellow color, unpleasant smell, much suspended matter.	5·04	337·25	Do.
„	15, Nilmony Mitter's Lane.	C	Do.	White color, slightly opalescent, little suspended matter, animal life.	5·04	319·50	Do.
„	135, Machooa Bazar Street.	F	Do.	Yellowish green color, slight smell, much suspended matter, animal life.	22·40	1029·5	Do.
„	54, Old Boytuckhana Bazar Street.	I	Do.	Almost colorless, no smell, little suspended matter, no visible animal life.	3·62	532·50	Do.

Well Waters, 1878—*Concluded.*

Date.	Locality.	Section.	Reason why water was submitted to analysis.	Description.	Total Ammonia parts per million.	Chlorine parts per million.	Whether condemned for domestic purposes or not.	What was done to the well.
July 12.	27, Zig Zag Lane.	J	Complaint.	Brownish color, faint smell, much suspended matter, animal life.	0·10	85·20	Condemned.	
„ 15.	48-2-2, Bulloram Dey's St.	F	Complaint.	Deep yellow brown color, unpleasant smell, large quantity of suspended matter, animal life.	7·20	426·00	Do.	
Sep. 23.	Gangaram Barick's Well, 4, Bysack Bagan Lane.	F	For improving Gowala Bustee.	Deep yellow brown color, slight smell, small quantity of suspended matter, no visible animal life.	45·12	869·75	Do.	
„ 24.	Jogendra Nath Matee, 4, Bysack Bagan Lane.	F	For improving Gowala Bustee.	Yellow brown color, unpleasant smell, small quantity of suspended matter, visible animal life.	46·80	852·00	Do.	
Dec. 16.	19, Durjeepara Street.	C	Cholera in neighbourhood.	Almost colorless, no smell, small quantity of suspended matter, no visible animal life.	3·07	213·00	Do.	
„ 17.	1, Outram Street.	O	Complaint.	Slight color, stinks on keeping, considerable quantity of suspended matter.	4·52	17·75	Do.	
„ 18.	4, Nursing's Lane.	I	Cholera in neighbourhood.	Yellow color, faint unpleasant smell, no suspended matter.	7·28	301·75	Do.	
„ 19.	340, Upper Chitpore Road.	B	Do.	Yellow color, slight unpleasant smell on keeping, small quantity of suspended matter.	1·17	213·00	Do.	

Well Waters, 1879.

Date.	Locality.	Section.	Reason why water was submitted to analysis.	Description.	Total Ammonia parts per million.	Chlorine parts per million of water.	Whether condemned for domestic purposes or not.	What was done to the well.
Jan. 10.	14-2-89, Machooa Bazar Street.	H	On the receipt of objection from the owner to dewater.	Almost colorless, no smell, small quantity suspended matter, animal life.	0·33	639·00	Condemned.	
„ 15.	69, Sitanarain Ghosh's Street.	I	Do.	Yellow color, no smell, opalescent, contains suspended matter.	12·60	372·75	Do.	
June 17.	29, E. Gopee Kristo Paul's Lane.	B	Do.	Bright yellow color, unpleasant smell, small quantity suspended matter, no animal life.	7·92	301·75	Do.	
				1880.				
Jan. 23.	6, Brindabun Mullik's Lane.	D	Complaint.	Black color, stinks abominably, large quantity of suspended matter, animal life.	64·00	514·75	Do.	

Taking the results obtained by the Total Ammonia Test, and judged by the standards which have been put forward by Prof. Wanklyn, and the additional somewhat rough ones suggested by myself, it will be seen, as might be expected, that no single tank or well water was of extraordinary organic purity, and that there were only seven tank waters included under the head of "safe" waters, five of which were from tanks on the maidan. Of dirty waters there were 26 out of the 200 or 13 per cent.; of waters considerably contaminated with sewage matter 64 were found, or 32 per cent.; of dilute sewages there were 32, or 16 per cent.; and of real genuine sewages 71 were found or 35½ per cent., that is rather more than one third of the whole number.

In the following table these results are separated into the two classes of tank and well waters, and it will be seen that the impurity of both descriptions of waters is nearly equal when judged by this test.

	Sewages more than 10 parts of total ammonia.	Dilute Sewages from 10 to 5 parts of total ammonia.	Waters contaminated with considerable quantities of sewage, from 5-1 parts of total ammonia.	Dirty waters from 1 to 0·1 parts of total ammonia.	Safe waters from 0·1 to 0·05 parts of total ammonia.	Very pure waters less than 0·05 parts of total ammonia.	Total.
Tank waters, ...	52	19	36	10	7	0	124
Percentage, ...	42	15	30	7	6	0	100
Well waters, ...	19	13	28	16	0	0	76
Percentage, ...	25	17	37	21	0	0	100
Percentage of both well and tank water, ...	35½	16	32	13	3½	0	100

In considering the quantities of chlorine present, notice must be taken of the fact that in a well water the amount of chlorine will be relatively greater than that of the total ammonia derived from the organic matter, because in the filtration of the water through the soil to reach the well, all the insoluble portions of the organic matter present in the sewage, etc., will be stopped, whilst the chlorides will readily pass through in solution. Again in the filtration of contaminated water through layers of earth or soil, a certain proportion of the organic matter will be oxidized and converted into inorganic compounds such as nitrates, which will not yield any ammonia on distillation with alkaline potassium permanganate. Thus we may expect, that a larger proportion of the well waters will be condemned by the chlorine process than would be condemned by the total ammonia test.

The following table will show the classification of the tank and well waters according to the amounts of chlorine.

	Sewages containing more than 250 parts of chlorine per million.	Dilute sewages containing from 250 to 150 parts of chlorine per million.	Waters contaminated with considerable quantities of sewage containing from 150 to 100 parts of chlorine per million.	Dirty waters containing from 100 to 50 parts of chlorine per million.	Moderately safe waters containing from 50 to 20 parts of chlo. per million.	Good waters less than 20 parts of chlorine per million.	Total.
Tank waters,...	56	38	14	6	7	3	124
Percentage, ...	45	30	11	5	6	3	100
Well waters,...	49	18	1	5	2	1	76
Percentage, ...	64	24	1	7	3	1	100
Percentage of well and tank waters, ...	52½	28	7½	5½	4½	2	100

It would of course be quite permissible to consider waters which have been condemned by *either* of these two methods to be sewages, dilute sewages or unfit for domestic use, etc., but on inspection of the tables it will be seen, that as a general rule a water which is condemned by the total ammonia test is also condemned by the amount of chlorine present.

The results, however, are sufficiently startling, if we only take the mean of the results of the two determinations; and at the very lowest estimate it must be said, that of the 200 samples of Calcutta tank and well waters examined by me, forty-four per cent. were true sewages, twenty-two per cent. were dilute sewages, twenty per cent. of the waters were contaminated with considerable quantities of sewage, nine per cent. were "dirty waters," and about four or five per cent. only were moderately safe waters. These last consisted principally of the well kept tanks on the maidan, and two or three others in the southern part of the town.

In the next table I have grouped the well and tank waters according to the sections of the town to which they belong; in this table I have given, first the name of each section and its population per acre according to the census of 1876, then the total number of waters analysed from each section, with their classification according to the plan before adopted. There is also given the average composition of all the waters analysed in each section. It will be strikingly seen from this table, how much more impure the tanks and wells of the northern divisions are, than those of the southern sections of the town.

NAME OF SECTION.	Sectional letter.	Population per acre by Census of 1876.	No. of waters analysed.	No. classed as Sewages.	No. classed as Dilute Sewages.	No. classed as waters containing considerable quantities of sewage.	No. classed as Dirty waters.	No. classed as Moderately Safe waters.	No. classed as Good waters.	AVERAGE COMPOSITION OF ALL WATERS.	
										Total ammonia parts per million.	Chlorine parts per million.
A. *Tank Waters.*											
Shampooker,	A	75	10	4	1	5	0	0	0	8·86	339·0
Koomartooly,	B	163	4	3	1	0	0	0	0	12·60	377·2
Burtolla,	C	84	21	15	2	4	0	0	0	14·62	367·7
Sookea's Street,	D	87	14	5	2	6	1	0	0	6·48	215·3
Jorabagan,	E	152	1	1	0	0	0	0	0	17·00	319·5
Jorasanko,	F	137	6	4	1	1	0	0	0	26·21	295·8
Burra Bazar,	G	108	2	1	0	0	1	0	0	4·24	191·6
Colootollah,	H	214	1	1	0	0	0	0	0	92·40	177·5
Moocheeparra,	I	141	2	1	1	0	0	0	0	8·20	199·1
Bow Bazar,	J	156	4	2	0	2	0	0	0	21·93	209·5
Puddopooker,	K	119	13	11	2	0	0	0	0	51·77	307·2
Waterloo Street,	L	27	0	0	0	0	0	0	0		
Fenwick Bazar,	M	135	3	1	0	0	2	0	0	4·96	164·0
Taltollah,	N	124	14	7	3	4	0	0	0	23·70	241·9
Colinga,	O	72	10	1	2	6	1	0	0	5·13	164·0
Park Street,	P	23	0	0	0	0	0	0	0		
Bamun Bustee,	Q	30	3	1	1	0	1	0	0	7·17	162·1
Hastings,	R	86	3	0	0	0	0	2	1	0·09	53·0
Maidan,	...	...	5	0	0	0	0	2	3	0·09	19·1
B. *Well Waters.*											
Shampooker,	A	75	1	1	0	0	0	0	0	12·80	582·2
Koomartooly,	B	163	12	8	3	1	0	0	0	17·90	466·1
Burtolla,	C	84	5	1	1	3	0	0	0	3·99	240·0
Sookea's Street,	D	87	2	2	0	0	0	0	0	49·87	621·2
Jorabagan,	E	152	25	5	2	16	2	0	0	21·17	371·7
Jorasanko,	F	137	7	5	1	1	0	0	0	19.87	535·0
Burra Bazar,	G	108	6	0	1	3	2	0	0	1·82	410·8
Colootollah,	H	214	1	0	0	1	0	0	0	0·33	639·0
Moocheeparra,	I	141	7	2	2	2	0	1	0	5·58	299·4
Bow Bazar,	J	156	2	0	1	0	1	0	0	1·71	406·5
Puddapooker,	K	119	4	2	0	2	0	0	0	18·95	518·7
Fenwick Bazar,	M	135	2	1	1	0	0	0	0	6·62	426·0
Taltollah,	N	124	2	0	1	1	0	0	0	2·12	541·4

In classifying these waters I have not separately considered the two numbers I obtained by analysis for the total ammonia and chlorine, but have decided on the character of each water from the amounts of both these substances, and this table would therefore show the exact character which I have attached to the waters which I have analysed.

I scarcely think that it is necessary to criticise in detail the numbers which I have obtained in these analyses. In some instances the results of analyses showed that the tank and well waters are considerably more impure than the very concentrated Calcutta sewage, which was collected at the Pumping Station on December 18th, 1876. I have indeed never read in any work or research of such horribly filthy waters as these are, and they are waters which are now, or have been formerly used for domestic purposes by many of the poorer inhabitants of Calcutta.

Taking the numbers given in the foregoing tables, it may be said as a general result of the whole of these analyses, that an average Calcutta tank or well water contains 16·2 parts of total ammonia and 320·6 parts of chlorine per million of water. This it will be remembered from one of the previous tables, is if anything rather more impure than ordinary English sewage as obtained and analysed by Prof. Wanklyn. In the table referred to Prof. Wanklyn found in a sample of sewage 17·10 parts of Total Ammonia and 141·4 parts of Chlorine. We may also say that the average Calcutta tank or well water contains more than 400 times as much organic nitrogenous matter as is usually present in the hydrant water.

I have, however, no wish to enlarge to any extent on this decidedly nauseous topic, but perhaps the most striking condemnation of the well and tank waters of Calcutta, and which will appeal to every inhabitant, whether scientific or otherwise, is to say, that a good average quality of Calcutta tank or shallow well water may be made, by mixing six parts of our present hydrant water with from one to two parts of the most concentrated Calcutta sewage. This artificial tank or well water will be of about the average composition; it will also be so far as can be judged, equally healthy for potable and domestic purposes, and as for its taste, odour, etc., it will probably be rather superior to the general run of Calcutta tank and well waters.

So far as I can ascertain this was the kind of water which was commonly used for drinking and domestic purposes in Calcutta in former days, and which may to a certain extent be still used by the poorer inhabitants of the northern quarter of the town.

The present water supply, i. e., the Hydrant water.

I need scarcely mention that our present hydrant water consists of the Hooghly water pumped from the river at Pultah; it is there collected in settling tanks, and after subsidence it is filtered through sand and then supplied to Calcutta. As I have made some remarks as to the quantity of the former water supply of Calcutta, this paper would not be complete if I did not refer to the quantity of our present supply. From the Report of the Municipality for the year 1879, I find that as the average for the whole year, 7,464,159 gallons of filtered water were daily supplied to the town. According to Mr. Beverley's Census of 1876, the number of inhabitants was 429,535, and each inhabitant would therefore receive 17·4 gallons of filtered water daily. But in addition to the filtered water, there is an unfiltered supply pumped up at Chandpal Ghat which is widely distributed through the town, where it is I believe used for such purposes as watering the roads and streets, flushing latrines and sewers, filling reserved tanks, etc. The daily unfiltered supply was on the average of the whole year, 1,091,866 gallons, and therefore the total daily supply in Calcutta for the past year was 8,556,025 gallons, equivalent to 19·92 gallons per head, or practically there were 20 gallons of water available for domestic and sanitary purposes for each inhabitant. This though perhaps not an abundant supply is a fairly liberal one, and is very much larger than the quantity of the old supply from tanks and wells. It is, however, not equal to the quantity allowed in most European towns, for as pointed out in a former part of this paper the average daily water supply of English towns is at least 25 gallons per head of population. In this country, however, it would appear that a more liberal supply would be required than in a European climate, and it has therefore been proposed to double the present amount of filtered water, in which case Calcutta would receive a daily supply of 16,000,000 gallons equivalent to 37·2 gallons per head. If this proposal is carried out, the supply of filtered water will be most abundant, and it will be amply sufficient for every possible want of the town so long as it keeps to its present dimensions.

The quality of the hydrant water as I mentioned before has been determined for four years, month by month, by Dr. Frankland's process of analysis. This is certainly the most elaborate and complete method discovered, and it is believed to show the quality of a water, not only as regards its present actual constituents, but also to indicate to a certain extent, what its previous history has been. In this process it may be stated the following operations are performed: first the amount of total solids dissolved in the water is estimated, then the amounts of carbon and nitrogen present in the organic matter are determined (these are called organic carbon and organic nitrogen in the following tables); next the amount of free ammonia present (if any) is determined, and the amount of nitrogen contained in the form of nitrates or nitrites is estimated; the amount of chlorine present as chlorides is also determined, and finally the hardness of the water, temporary, permanent and total is estimated. Of these determinations the second, third, fourth and fifth are the most important from a hygienic point of view. Thus the amounts of organic carbon and nitrogen represent the organic matter existing as such in the water, at the time of analysis. The ammonia may to a certain extent be due to the original ammonia we find in rain water, but more generally it may have been produced by the introduction of sewage matter into the water. The nitrates and nitrites present in water are derived from the oxidation of nitrogenous organic matter; this oxidation may have taken place either in the water itself, or in the soil on which the rain water fell. These last constituents are to be looked on with suspicion unless the water is derived from a deep well, when it may contain considerable quantities of these substances without giving rise to any alarm. It is not that nitrates in themselves are injurious in any way, but their occurrence in any quantity in river or shallow well waters shows, that the water must have been either contaminated with some nitrogenous organic matter in a state of decomposition, or in some circumstances where decomposing nitrogenous organic matter had been previously present. It is pointed out that it must be more or less dangerous to drink water that has thus been contaminated with organic matter or with nitrates derived from organic matter, for it is possible if not probable that in such a water the most noxious of all its constituents would entirely escape oxidation or any kind of change. The reason for this opinion is very clearly expressed in one of Dr. Frankland's papers on potable water. In the Journal of the Chemical Society, March 1868, at page 31 of his Memoir, he says—"There is also another aspect in which the previous sewage contamination of a water (*i. e.*, the presence of large quantities of nitrates etc.) assumes a high degree of importance; if the shell of an egg were broken, and its contents beaten up with water, and thrown into the Thames at Oxford, the albumen would probably be entirely converted into mineral compounds before it reached Teddington, but no such destruction of the nitrogenous organic matter would ensue, if the egg were carried down the stream unbroken for the same distance; the egg would even retain its vitality under circumstances which would break up and destroy dead or unorganised organic matter. Now excrementitious matters certainly, sometimes, if not always, contain the germs or ova of organized beings, and as many of these can doubtless retain their vitality for a long time in water, it follows that they can resist the oxidizing influences which destroy the excrementitious matters associated with them. Hence great previous sewage contamination in a water means great risk of the presence of these germs, which, on account of their sparseness and minute size, utterly elude the most delicate determinations of chemical analysis." A considerable number of chemists have put forward the statement, that a river water which has been contaminated with sewage matters will entirely purify itself in a flow of a few miles, and will thus again become fit for potable and domestic purposes. The weight of the evidence appears however to disprove this statement, and further experiments made by Dr. Frankland have shown that this oxidation of sewage matter when present in running water is a process of extreme slowness. Thus in the report of the Rivers Pollution Commissioners, he writes:

"Assuming, however, that if the polluted water had been constantly exposed to the air, a portion at least of the oxygen used would have been replaced, and assuming further that the oxidation proceeded during 168 hours at the maximum rate observed, then at the end of that time, only 62·3 per cent. of the sewage would be oxidized.

"It is thus evident that so far from sewage mixed with 20 times its volume of water being oxidized during a flow of 10 or 12 miles, scarcely two-thirds of it would be so destroyed in a flow of 168 miles, at the rate of one mile per hour, or after the lapse of a week. But even this result is arrived at by a series of assumptions which are all greatly in favour of the efficiency of the oxidizing process. Thus, for instance, it is assumed that 62·3 per cent. of sewage is thoroughly oxidized, and converted into inoffensive inorganic matter, but the experiments showed that, in fact, no sewage matter whatever was converted or destroyed even after the lapse of a week, since the amount of carbonic acid dissolved in the water remained constant during the whole period of the experiment, whilst, if the sewage had been converted into inorganic compounds, the carbonic acid, as one of these compounds, must have increased in quantity.

"Thus, whether we examine the organic pollution of a river at different points of its flow, or the rate of disappearance of the organic matter of sewage when the latter is mixed with fresh water, and violently agitated in contact with air, or finally, the rate at which dissolved oxygen disappears in water polluted with 5 per cent. of sewage, we are led in each case to the inevitable conclusion, that the oxidation of the organic matter in sewage proceeds with extreme slowness, even when the sewage is mixed with a large volume of unpolluted water, and that it is impossible to say how far such water must flow before the sewage matter becomes thoroughly oxidized. It will be safe to infer, however, from the above results, that there is no river in the United Kingdom long enough to effect the destruction of sewage by oxidation."

Thus Dr. Frankland is of opinion that a river water once largely contaminated with sewage or organic matter can never of itself become sufficiently pure again to be a safe water supply. To this point I shall again have occasion to refer, when speaking of the proposed sources of the new supply.

From these remarks it will be seen that in judging of the quality of a potable water by Frankland's process of analysis, we pay the greatest amount of attention to the amounts of ammonia and of organic carbon and nitrogen, as representing organic matter actually present, whilst we depend upon the amount of nitrates (and to a considerable extent also on the amount of chlorides as explained in the previous part of this paper) to indicate organic contamination which has become oxidized. The amounts of total solids and of Hardness although important from a manufacturer's point of view, do not seem to have any marked action on the health of persons drinking such water, except when such constituents are present in very large quantities.

Dr. Frankland has unfortunately not fixed upon any very definite standard as to the amounts of the above substances which may be present in water and yet not render it dangerous, and in fact it is almost impossible to draw any hard and fast rule; but so far as can be ascertained from his writings, Dr. Frankland appears to think that a supply which contains 0·10 parts of organic carbon and nitrogen in every hundred thousand parts of water is of "great organic purity," whilst one containing 0·30 parts of the same substances in the same volume should be considered a water of "fair organic purity." If the quantity is above this a water would be of doubtful purity, and if in still larger quantities the water would be recognized as impure.

In order to give an idea of the quantities of these various substances present in the water supplies of many of the large towns in England, and to show the average composition of different samples of water from various sources, I append a table giving the results by this method of analysis of the London water supply from the rivers Thames and Lea, and from the deep wells in the chalk, also the results of the Edinburgh, Glasgow, Liverpool, Manchester and Dublin water supplies, and the average composition derived from the analysis of a large number of samples of rain water, upland surface water, spring water, and sea water. Most of these numbers are taken from the various reports of the Royal Commissioners who were appointed to investigate the Pollution of Rivers in England, but some of the numbers come from the article on Water Analysis given in "Sutton's Volumetric Analysis."

See Table, page 120.

Having thus settled our standards for comparison, we can now discuss the present water supply of Calcutta. The results obtained by the analysis of the Hydrant water are given in the following table; the numbers shown for each month are the averages for the past four years, and at the foot of the table, the general average for the whole of the four years is appended.

See Table, page 121.

Results of Analysis expressed in parts per 100,000.

	Total solid Impurity.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen as Nitrates and Nitrites.	Total Combined Nitrogen.	Chlorine.	HARDNESS.			REMARKS.
								Temporary.	Permanent.	Total.	
London Water supply, average for 7 years.											
From the Thames, ...	27·26	·201	·033	·001	·204	·238	1·77	...	...	21·20	
From the Lea, ...	27·79	·135	·024	·000	·199	·223	1·79	...	...	21·30	
From the Deep-wells in the Chalk, ...	40·26	·047	·012	·000	·421	·433	2·43	...	...	28·70	
Edinburgh water supply, ...	14·10	·203	·042	·000	None.	·042	0·89	4·40	4·80	9·20	
Glasgow water supply from Loch Katrine, ...	2·40	·185	·022	·001	Do.	·023	0·85	0·00	0·90	0·90	
Liverpool water supply, ...	9·66	·210	·029	·002	Do.	·031	1·53	0·30	3·70	4·00	
Manchester do., ...	7·00	·132	·031	·002	Do.	·033	0·90	0·00	2·70	2·70	
Dublin do., ...	6·34	·238	·024	·001	Do.	·025	1·24	0·00	2·97	2·97	
Switzerland the Rhine above Schaffhausen,	15·80	·108	·012	·003	Do.	·015	0·20	3·99	6·77	10·76	
London Sewage, ...	64·50	4·386	2·484	5·557	Do.	7·060	10·37	...	...	...	
Average composition of UNPOLLUTED WATER.											
Rain water 39 samples, ...	2·95	·070	·015	·024	·003	·042	0·22	...	...	·30	
Upland surface water 195 "	9·67	·322	·032	·002	·009	·043	1·13	1·50	4·30	5·80	
Deep well water 157 "	43·78	·061	·018	·010	·495	·523	5·11	15·80	9·20	25·00	
Spring water 198 "	28·20	·056	·013	·001	·383	·397	2·49	11·00	7·50	18·50	
Sea water 23 "	3898·7	·278	·165	·005	·033	·203	1975·6	48·90	748·00	796·90	

CALCUTTA HYDRANT WATER.

Average results from the Analysis of four years.

Results of Analysis expressed in parts per 100,000.

	Total solid Impurity.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen as Nitrates and Nitrites.	Total Combined Nitrogen.	Chlorine.	Hardness.			Remarks.
								Temporary.	Permanent.	Total.	
Average for 1st of January, ...	21·57	·131	·037	None.	·016	·053	0·87	3·72	2·97	6·69	
Do. February	21·79	·179	·058	Do.	·035	·093	1·00	3·56	2·92	6·48	
Do. March, ...	22·37	·114	·063	Do.	·048	·111	1·20	3·64	2·97	6·61	
Do. April,...	21·68	·124	.046	Do.	·034	·080	1·32	3·07	2·72	5·79	
Do. May, ...	21·23	·120	·045	Do.	·030	·075	1·37	3·08	3·16	6·24	
Do. June,...	19·43	·155	·037	Do.	·017	·054	1·37	2·44	3·79	6·23	
Do. July, ...	13·04	·093	·044	Do.	·049	·093	0·85	1·65	2·83	4·48	
Do. August, ...	12·07	·081	·047	Do.	·055	·102	0·67	0·93	2·64	3·57	
Do. September, ...	11·36	·104	·049	Do.	·046	·095	0·58	1·34	3·00	4·34	
Do. October, ...	11·30	·099	·050	Do.	·027	·077	0·61	1·39	3·32	4·71	
Do. November, ...	12·27	·118	·054	Do.	·021	·075	0·73	2·15	2·92	5·07	
Do. December, ...	19·44	·090	·042	Do.	·025	·067	0·88	2·55	2·93	5·48	
Sums, ...	207·55	1·408	·572	Do.	·403	·975	11·45	29.52	36·17	65·69	
Average for year	17·30	·117	·047	Do.	·034	·081	0·95	2·46	3·02	5·48	

Taking the numbers representing the general average for the year and comparing them with the standards which I have suggested from Dr. Frankland's works, we find that the Calcutta water falls just outside the class of waters of "great organic purity," but that it is well within the class of waters of "fair organic purity."

Comparing again the numbers with those given in the previous table we find that the Calcutta Hydrant water though not so pure as the London waters derived from the deep wells in the Chalk, is certainly purer than the waters derived from the Thames, and perhaps also from the Lea. It is also decidedly more free from impurity than the water supplies of Edinburgh, Liverpool and Dublin, but taking all the constituents into consideration, it is not so pure as the Glasgow or Manchester supplies, or as the Rhine water above Schaffhausen. Comparing the Hydrant water with the average composition of *unpolluted* upland surface water as given by Dr. Frankland, we find that it is scarcely so pure as unpolluted water should be, and we are therefore compelled to admit that the Hooghly water has been slightly contaminated before it reaches Pultah. The amount of contamination is, however, not very great and as pointed out before, the Calcutta water falls well within the class of waters of medium purity. That the Calcutta water must be contaminated to a certain extent will be I think obvious to any one who is acquainted with the customs of the inhabitants of India, and more particularly of the inhabitants of villages and towns on the banks of the rivers. This contamination is a drawback to the complete safety of our water supply, for as pointed out previously, Dr. Frankland is of opinion, that a water once contaminated is always dangerous, and that the self-purification of a river which is so strongly insisted upon by certain persons is exceedingly slight. It does not however at present appear to be possible to cut off these sources of contamination, and the Hydrant water though good is not a perfect supply. Every effort however should be made to keep this previous contamination down to the lowest possible point, and it is to be hoped when systems of drainage are being introduced into the up-country towns, that the sewage from them will not be allowed to find its way into our river. Speaking generally the sewage from any one town should not be allowed to find its way into a river which is used as a source of water supply for other towns lower down.

It is not my intention to criticise these average numbers in detail, but it will suffice to say that from the absence of ammonia and from the smallness of the amounts of organic carbon and nitrogen, and of nitrates and nitrites, and also of chlorine, it is clearly evident that the contamination of the Calcutta water is really much smaller than might have been expected under the circumstances, and we may rest assured that our water supply is of fairly good quality, better in fact than that received by the majority of large towns in Europe.

In considering the results of the analysis of the Calcutta water month by month, we find that its composition varies considerably at different parts of the year. A close inspection of the table will show that apparently there are two distinct causes at work in modifying the composition of the water. The first prominent cause, and the one which has by far the greater influence, is to be found in the commencement, and during the continuance of the rainy season; the second and smaller cause appears to be the melting of the Himalayan snows by the burning sun of March, April, May and June. These changes are most clearly noticed in the column of Total Solid Impurity, and here we read that starting in January the amounts of total solids gradually increase up to March, when 22·37 parts are present in every hundred thousand parts of water; in April and May the quantities steadily and gradually diminish, the numbers being 21·68 and 21·23 respectively; this decrease continues until June 1st when there are only 19·43 parts of solid impurity present. These numbers of course correspond with the gradual and increasing diluting effect due to the admixture of pure snow water with the ordinary river water. In the middle of June, however, the rainy season usually commences, and there is a sudden decrease in the solids owing to the diluting action of the enormous volumes of rain water, and we find only 13·04 parts on July 1st; from this time there is a slight but steady decrease until October, when the water contains the smallest amount of solids present at any time of the year; the average for October 1st showing 11·30 parts. After the complete cessation of the rains (after November 1st) there is again a sudden rise in the total solids, and on December 1st, 19·44 parts are present. Some of the other columns of figures show a somewhat similar change, but in the case of the organic matter the change is not very marked. In the amount of nitrates present in the water, there appear to be two distinct maximum quantities during the year, one in March at the time of greatest concentration of the water as before mentioned, and the second at the commencement of the rains. This second maximum is readily accounted for when we consider, that the first effect of the rains will be to dissolve out the nitrates which have been accumulating in the soil of the drier parts of the country during the hot season; the amount of nitrates, however, it will be seen, steadily decreases towards the end of the rains, and this to a certain extent confirms the explanation.

Indeed during the first weeks or even days of the rainy season, the composition of our water supply is undergoing very rapid change, owing to the diluting action of the rain, and to the fact that the first showers of rain will wash out considerable quantities of soluble organic matter, nitrates etc., from the soil; afterwards, however, the rain water will run off comparatively pure. We shall therefore expect that the first action of the rain will be to decrease the total solids, and to increase the amounts of organic impurity and of nitrates, and that afterwards all the constituents will decrease in quantity.

That such is the case may be seen by the following analyses made on June 1st, 23rd and 26th and July 1st of last year. Each of the analyses shows the gradual dilution of the water by the heavy falls of rain in the districts from which our supply is collected, and the increase of organic matter and of nitrates due to the washing out of the substances from the soil by the first showers of rain.

HOOGHLY WATER.

Results of Analysis expressed in parts per 100,000.

Number of Sample.	Date of collection of Sample.	Total solid Impurity.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen as Nitrates and Nitrites.	Total Combined Nitrogen.	Chlorine.	Hardness.		
									Temporary.	Permanent.	Total.
1	June 1st, 1879,	19·56	0·130	0·052	·000	Traces only.	0·052	1·32	4·24	2·45	6·79
2	June 23rd, „	17·08	0·148	0·099	·001	·023	0·123	0·923	3·46	3·25	6·71
3	June 26th, „	16·68	0·138	0·075	·002	·053	0·130	0·852	3·33	3·38	6·71
4	July 1st, „	12·48	0·113	0·093	·000	·039	0·132	0·89	0·72	4·57	5·29

Extension of the Present Water Supply.

As pointed out previously it is now proposed to double the supply of filtered water for Calcutta, and recently a proposal has been urged on the Corporation to collect the new supply of water at Cossipore or Dukhinsahar instead of as at present at Pultah. As I was consulted on this subject and gave a strong recommendation that the water should not be taken from any place near to Calcutta, but that the present source at Pultah should still be used, I may perhaps be allowed to give the substance of my arguments against the two proposed sources of supply at Cossipore and at Dukhinsahar.

My opinions on this point are to a great extent founded on some previous analyses of the river water taken at various points near to Calcutta, which were made by Dr. Macnamara and Mr. Waldie, when the Calcutta supply was first being introduced, but in addition I have myself made a few analyses which have confirmed me in my conclusions.

The usual time for pumping up the water from the river into the settling tanks is at five hours' ebb; this is of course done so as to avoid the possibility of taking in any tidal water and as far as possible to secure only the true river water. The proposals for taking the water for these two places appeared then to resolve themselves into two questions.

(*a*) Whether at five hours of ebb the water off Cossipore, *at all seasons of the year* can be relied on as a safe source of water-supply.

(*b*) Whether at five hours of ebb, the water at a distance of two or three miles above Cossipore, *at all seasons of the year*, can be relied on as a safe source of water-supply. For I think it will be generally admitted, if at either place, at any one season of the year, the quality of the water cannot be relied on, this would be equivalent to a condemnation of the proposed place of supply.

Before proceeding to deal with the actual results of the analyses which have been previously made by the two gentlemen abovementioned, it will be well to take a general review of the conditions of our river from which the water-supply is to be derived. The river, as is well known, is a tidal one to a considerable distance above its mouth, and it appears certain that the tidal water does not at any season of the year, or under any ordinary circumstances, reach higher than Chinsurah. I have already shown in a previous part of this paper that the true river water, as it has been delivered of late years in Calcutta, is a tolerably pure and reliable supply, and that there has never been the slightest suspicion of any appreciable admixture of tidal water with the natural river water, in the hydrant water now supplied from Pultah. This of course, is because the water is collected at a considerable distance up the river, and that it is taken at five hours' ebb.

The tidal water however, in flowing up past Calcutta undoubtedly, must become contaminated with a variety of impurities. It may be true that a large proportion, or perhaps nearly the whole of the sewage, as collected in the drains of this town, is now carried to the Salt Water Lakes, but no one, knowing the habits of the lower orders of the natives of this country, will believe, that this represents the sum total of the sewage. In all probability, there is a large amount of filth of various kinds, which finds its way direct into the river. Again, on the banks of the river numerous factories have now sprung up, and it will be quite unlike the usual experience in England if these factories, unrestrained by Acts of Parliament, do not also send a large amount of filth, refuse, &c, into the running stream beside them. I am not aware what sanitary arrangements are made on the Howrah side of the river, but it has always appeared to me, that a large amount of drainage reaches the river from that source.

Also it must be remembered that Calcutta is a large shipping port; thus on the average I believe there are about 2,000 vessels annually arriving and departing from the port, aggregating nearly two and a half millions of tons; to these must be added the very large numbers of country boats, dinghis, &c., which line the shores and which help to carry on the great and increasing trade of Calcutta. Omitting the actual business operations carried on, it must be admitted, that the crews of these vessels will add a not inconsiderable amount of sewage contamination to the river water. The tidal water, in flowing past Calcutta, must of necessity then carry with it all such contamination, and will in that state be probably, if not certainly, unfit for drinking, or even for domestic purposes.

I think it cannot be disputed that, in selecting a site from which to collect water for *drinking and domestic* purposes, it will be essential, that at all seasons of the year, at the ordinary time of collection, (five hours' ebb) there shall be practically no admixture of tidal water with river water proper; for it is evident, that the tidal water will always be contaminated with various kinds of organic matter.

The two questions which I suggested previously, thus become limited to the consideration of whether at Cossipore, or at two or three miles above it, the water at five hours' ebb is free from contamination with tidal water at *all* seasons of the year. It would be bad enough to supply brackish tidal water for drinking purposes, but far worse to supply tidal water, which had collected all sorts of filth and abomination on its way up.

Having suggested what it appears necessary to prove, we can now pass on to the consideration of the analyses which have been made on this point. Most of these analyses were made from 12 to 18 years since, when comparatively little attention had been given to the subject of water analysis, and an important part of the method of analysis then employed has been since shown to be eminently untrustworthy and unreliable. The suitability of a water for domestic purposes is (as pointed out previously) believed to depend principally on its freedom from organic contamination, I am sorry to say that the methods for the determination of organic matter in water, used in the old analyses under notice, have been since shown to give at the best but very rough indications, which do not at all represent the absolute amounts of organic matter present. Though these methods of analysis failed to give thoroughly reliable information, yet I do not think it too much to assume that, to a certain extent, they gave information as to comparative purity of samples of the same variety of water, and valuable information may thus be extracted from them. By this I do not mean to say that the exact *proportional* freedom of the water from organic matter will be represented by the figures given in these analyses, but I do think that they may indicate that certain samples are less pure than others, and so on. For the purpose of a simple comparison, these results will be almost as useful as absolute statements, for we may work on the basis, that the good quality of our Hydrant water has been satisfactorily demonstrated.

In passing I may mention that Mr. Waldie disputes the correctness of Dr. Macnamara's results as to amount of organic matter present in the water, but it would be quite as easy for me, with a knowledge of the progress of the last ten years, to dispute the correctness of Mr. Waldie's results, so that in both cases, the results of the old analyses as to organic matter are to be accepted as comparative statements, rather than actual truths. It must be clearly understood, however, that I have no wish to under-rate the value of the work done by Dr. Macnamara and by Mr. Waldie; far from it, I believe that the results criticized are as accurate and reliable as could be obtained by the processes then known, and in those portions of the work, where the methods of analysis have not been changed, I think we may rely, with certainty, on the accuracy of the results given.

In the face of the above facts, I may be pardoned, if in considering these old analyses I draw more particular attention to the determination of the inorganic substances present, where the methods of analysis have scarcely changed, and refer less to the determinations of the organic substances present in the water.

In tidal water, that is water of which a part at least has been derived from the sea, sodium chloride, or common salt, is a prominent ingredient. In the table given on p. 120, it will be seen that sea water contains no less than 1975·6 parts of chlorine per hundred thousand of water; this substance, on the other hand, is present in very minute quantities in the true river water, and hence we have a crucial test to apply, in order to determine the presence or absence of tidal water in the samples in question. It may here also be well to remark that the process of analysis for the determination of chlorine in waters has not changed since the period when the analyses by Dr. Macnamara and Mr. Waldie were made, and therefore we may entirely rely on the accuracy of the results given as to the amounts of this constituent present in the samples of water analysed.

In the following table I quote four sets of analyses made by Dr. Macnamara of water collected, *at low water in each case*, from three different points in the river, namely, at Chinsurah, Pultah and off Cossipore, (one mile above Baug Bazar Bridge). For the sake of comparison I have added to the table some of the numbers obtained in the regular analysis of water for the year 1878.

ANALYSES OF WATER TAKEN IN THE MIDDLE OF STREAM SIX FEET FROM SURFACE.

Results expressed in parts per 100,000 *of water.*

	CONSTITUENT.	LOW WATER.	LOW WATER.	LOW WATER.	LOW WATER.
		17th December 1861.	15th March 1862.	12th June 1862.	8th September 1862.
Chinsurah.	Total solid residue from filtered water	26·6	27·9	..	12·9
	Organic matter	6·0	5·6	..	2·6
	Insoluble earthy salts	16·9	19·9	..	8·0
	Soluble salts	3·6	1·9	..	1·5
	Sodium chloride	..	1·1	..	0·8
Pultah.	Total solid residue from filtered water	23·1	27·3	26·3	14·6
	Organic matter	6·0	5·6	5·0	2·1
	Insoluble earthy salts	14·1	19.0	17·0	8·7
	Soluble salts	2·7	1·7	3·6	2·0
	Sodium chloride	..	1·1	3·6	0·9
Cossipore.	Total solid residue from filtered water	24·6	34·7	97·1	13·3
	Organic matter	5·0	5·6	11·9	2·1
	Insoluble earthy salts	16·7	19·3	16·4	9·0
	Soluble salts	2·6	8·9	67·6	1·3
	Sodium chloride	..	7·6	55·7	..
		1st December 1878.	1st March 1878.	1st June 1878.	1st September 1878.
Hydrant water.	Total solid residue	16·80	24·34	15·16	11·12
	Carbon and nitrogen of organic matter ..	0·158	0·164	0·111	0·124
	Sodium chloride	1·01	1·87	1·70	0·79

An examination of this table and of the numbers given in previous parts of this paper shows clearly that the pure river water, *i. e.*, the present hydrant water never contains more than two or at the outside three parts of sodium chloride per 100,000 of water. This is proved by Dr. Macnamara's analyses of the water at Chinsurah and Pultah, and also by the numbers obtained weekly and monthly by myself.

When however the analyses of Cossipore water are considered, it will be seen that, whilst at low water in September and December, its composition is very similar to that of pure river water collected higher up : in March and more particularly in June, there are very striking differences. Thus on June 12th 1862 whilst at Pultah, there were only 26 parts of solid impurity and 3·6 parts of sodium chloride or salt in every 100,000 parts of water, at Cossipore (one mile above Baug Bazar Bridge) on the same day, and *at low water*, in the same volume there were no less than 97·1 parts of solid impurity, of which 55·7 parts were sodium chloride. This clearly indicates that on this occasion, there was a very large admixture of tidal water with the river water. Dr. Macnamara's results, as to the amount of organic matter, also appear to show that in June, there was much more present in the Cossipore water than in that collected at Pultah, and this is really what would be expected to be the case. The ratio of the organic matter shown in the two instances is greater than 2 to 1, and I think that this difference must indicate that the water at Cossipore did contain an excess of organic matter over that contained at Pultah. The *absolute* amounts of organic matter were, we now know, very much smaller than the numbers given in the table, but we can probably rely, to a certain extent, on the *relative* correctness of the numbers given.

There appears then to be no escape from the conclusion which Dr. Macnamara draws in his criticism of these results when he says—"the water (at Cossipore) during March, April, May and June is largely intermixed with the saline matters of the sea water and the sewerage of Calcutta, and during that time is unfit for human consumption."

As before pointed out the sewage contamination would be very much less at the present time than it was then, but I have tried to prove that we cannot have an admixture of tidal water without at the same time having organic and sewage contamination. I have no doubt that during the rains when a powerful stream is running down, the water at Cossipore may be nearly as pure as that at Pultah, but I think that Dr. Macnamara's analyses alone prove that, during the hot weather months, the water at Cossipore is by no means pure enough to be selected as a water-supply.

Turning now to the analyses made by Mr. Waldie, it appears to me that they essentially confirm the results given by Dr. Macnamara. The water tested by Mr. Waldie was taken usually from the river at Burranagur, which is said to be two miles above Cossipore. Here on June 14th, 1866 at 11-5 A. M., (*at low water*) 30·7 parts of solid matter, of which 14·5 parts were sodium chloride, were found; again on May 1866, two hours before the commencement of tide, there were 21·50 parts of salt present; on May 2nd 1866, there were 15·50 parts of salt at ebb-tide, and on June 1st 1866 at nearly low water, 16·50 parts of sodium chloride were found; these numbers being the quantities present in 100,000 parts of water.

With regard to organic matter also Mr. Waldie's results, though showing much less organic matter than Dr. Macnamara's analyses, to a great extent confirm his statements, and prove that as a rule, there is a larger amount of organic matter in the water collected at ebb-tide off Burranagur, than in the water collected at higher points of the river. The numbers above quoted show unmistakeably that at *two miles above Cossipore* during the hot season, there is a decided admixture of tidal water and probably of sewage contamination with the pure river water, and that this is the case even with samples collected at low water.

The opinion of Dr. Macnamara as to the suitability of Cossipore water for drinking purposes, has already been given. I will now quote Mr. Waldie's remark in his general summary of results—"Can the supply be safely taken from the river at Cossipore? We can scarcely answer in the affirmative."

In conclusion, then, I may say that, so far as can be ascertained from the old analyses by Dr. Macnamara and Mr. Waldie, and from my own results, it is my opinion—

That during the rainy season, and whilst the river is in *full* stream, the water collected two miles above Cossipore, or perhaps even at Cossipore, could probably be used as a fairly safe water-supply.

That during the hot weather months, if the water is collected two miles above Cossipore, even at five hours' ebb, there will frequently, if not always, be contamination with tidal water to an extent, which unfits it for a safe water-supply, and the water will be contaminated to a still greater degree if collected at Cossipore.

That this tidal contamination would involve also organic contamination to a considerable extent, and that, as pointed out in a previous part of this paper, such organic or sewage contamination cannot become oxidized or destroyed during the flow of the water, nor can the water be purified by the ordinary processes of settling, filtration through sand etc. so as to render it a safe supply for domestic purposes. Such water therefore would be eminently unsafe for potable purposes and should be at once condemned.

That unless contrary evidence is furnished, the proposed new sources of supply are too near to the mouth of the river and to Calcutta, and consequently that it is strongly desirable that the extension of the water supply should be carried out on the same principle as formerly, and that the water should always be collected at Pultah, and not at the other points which have been suggested.

IX.—*On the Zoological Position of the Bharal, or Blue-Sheep, of Tibet.*—*By* R. LYDEKKER, B. A.

(Received Jan. 4th;—Read Feb. 4th, 1880.)

The Bharal or Blue-Sheep of the Tibetan region is one of those animals which are peculiarly interesting, and at the same time peculiarly puzzling, to the naturalist, on account of its presenting affinities to two distinct groups of animals, whereby the determination of its position in the zoological scale is a matter of some considerably difficulty.

As I shall show below, the bharal presents points of resemblance both to the sheep and the goats, and this intermediate character of the animal seems to have been the cause of considerable diversity of opinion among naturalists, as to what genus the animal should be referred. The late Mr. Bryan Hodgson, in the Society's Journal,* proposed the generic name ***Pseudois*** for the bharal. Mr. Hodgson, however, together with the late Mr. Blyth, thought that there were two species of the genus, to which were given the names *P. nahura* and *P. barhal.* The latter writer, however, according to the late Dr. Jerdon, seems finally to have come to the conclusion, that there was only one species of the genus, known as *P. nahura.* The late Dr. Gray, and, I believe, all subsequent writers, have adopted the view of there being but one species of bharal. Hodgson's generic distinction was adopted by Dr. Gray.† The late Mr. H. N. Turner,‡ however, and Mr. W. T. Blanford,§ class the bharal in the genus *Ovis*, though the last named writer does not give his reasons for so doing.

In the present paper, I shall notice certain points in the osteology of this animal, which indicate its close relationship to the goats, and which, I venture to think, are sufficient to confirm its generic distinction from *Ovis.*

Mr. Hodgson, in his above quoted paper, first pointed out that the bharal differed from all the true sheep in having no "eye-pits," but did not point out that the absence of these "eye-pits" was a character common to the bharal and the goats.‖

The so-called "eye-pits" are the depressions which occur in the lachrymal bones of many ruminants for the gland known as the "larmier." In all the true sheep, the lachrymal bone has a very considerable larmial depression, and the greater part of the outer surface of that bone is placed more or less nearly at right angles to the surface of the frontals; the suture connecting the lachrymal with the maxilla is placed in advance of the suture between the maxilla and the malar. In the goats, the outer surface of the lachrymal has no larmial depression, and the greater part of such surface is continuous with the plane of the frontals; the lachrymo-maxillary and malo-maxillary sutures are in one oblique line. In the bharal, there is likewise no larmial depression on the lachrymal and the outer surface of this bone slopes gradually away from the plane of the frontals; while the lachrymo-maxillary suture is only slightly in advance of the malo-maxillary suture. In the form and relations of the lachrymal, therefore, the bharal is decidedly much nearer to the goats than to the sheep.

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* J. A. S. B., Vol. xvi, p. 702.

† Cat. of Mammalia in Brit. Mus. Pt. iii, p. 177, 1852.

‡ "Scientific Results of 2nd Yarkund Mission," Mammalia, p. 85, Calcutta, 1874.

§ Pro. Zool. Soc. Lon. 1850, p. 176.

‖ I exclude the genus *Nemorhaedus* from the goats.

The next most important caprine character presented by the bharal skull, is in the basioccipital. In the true goats this bone is oblong in shape, with a pair of tubercles at the posterior and anterior extremities; of these, the posterior pair are considerably the larger and more prominent, but both are situated on the same antero-posterior line. In the true sheep, on the other hand, the basioccipital is always considerably wider in front than behind, while the anterior pair of tubercles are much larger than the posterior, and are placed wider apart. The basioccipital of the bharal agrees exactly with the basioccipital of the goats, and is, consequently, widely different from this part in the sheep.

In the form of its lower jaw, the bharal agrees with the sheep, and differs from the goats.

In the structure of its horns, the bharal again presents caprine affinities. In the true sheep the horns are always thrown into parallel transverse wrinkles extending completely round the horns; the colour of the horns is light brown, or greenish brown, and the direction of the extremity of the first curve is always downwards and forwards.

In the goats, on the other hand, the horns are never thrown into coarse and parallel transverse wrinkles, but are marked by finer striæ, and may or may not carry knobs anteriorly. Their colour is dark blackish brown: they are always more or less angulated; and the extremity of the first curve is directed backwards and upwards.

In the bharal, the structure and colour of the horns is the same as in the goats; the extremities of the horns are directed backwards and upwards; their angulation is less marked than in the goats. The horns of the bharal are indeed directed more outwards than those of the goats, and in this respect they present some points of resemblance to the sheep; the upward twist of their extremities, however, shows an approximation to the curved horn of the Markhoor and is quite different from the curve of any sheep's horn.

The profile of many goats, like the Ibex, is markedly concave; in others, however, as the Thar, it is nearly straight; the profile is also nearly straight in the sheep and bharal, and we cannot, therefore, draw any classificatory inference from this character.

In other cranial characters, there do not seem to be any well marked distinctions between sheep and goats. It, therefore, seems pretty evident that as far as cranial characters go, the bharal is undoubtedly much more closely related to the goats than to the sheep.

The bharal is, however, externally distinguished from the goats, by the absence of any odour or any trace of a beard or mane in the males There are feet-pits (interdigital pores) in all the feet of the bharal, in which respect it agrees with the sheep, and differs from the goats, in which these pits are either absent *(Hemitragus)*, or present only in the fore feet (*Capra*). The tail, according to Mr. Hodgson, is unlike that of the sheep.

From the above comparisons it will be seen that in the osteological characters of the head, the bharal is nearer the goats than the sheep, while in its external characters it is nearer to the sheep. The cranial characters pointed out above appear to me to be of such importance as to preclude classing the bharal in the genus *Ovis*, and I accordingly think that Mr. Hodgson's genus ***Pseudois*** should be retained for its reception. The animal most certainly forms a very closely connecting link between the genera *Capra* and *Ovis*, and it seems to be very difficult to say to which it is most nearly related.

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X.—*Description of a new Species of Diurnal Lepidoptera belonging to the Genus* Hebomoia.—*By* J. WOOD-MASON.

The beautiful insect described below has been recently received by the Indian Museum from the Andaman Islands, where it was obtained by Mr. A. de Roepstorff, after whom I have named it.

HEBOMOIA ROEPSTORFII, n. sp.

♂. Differs from *H. glaucippe*, the only species of the genus with which I have been able to compare it, *on the upper side*, in having the apical orange patch of the fore-wing larger, extended into the cell, and less broadly bordered with black, both internally and externally; the submarginal black spots smaller and completely isolated from the black of the outer margin; the fore-wing at the posterior angle tinged, and the hind-wing externally broadly bordered, with bright sulphur-yellow, which colour is shaded off into the cream-colour of the rest of both wings; and the outer margin of the hind-wing narrowly edged with black, which gradually broadens from the anal to the anterior angle and extends inwards in points at the veins:—and, *on the under side*, in having the brown mottling of the fore-wing arranged in the form of a tolerably conspicuous band coincident with the macular band of the upper side; and the ground-colour of the hind-wing, as also that of the mottled portion of the fore-wing, of a rich golden-luteous colour.

Expanse 3·5 inches.

HAB. S. Andaman.

The place of this species would seem to be between *H. vossii*, (Maitland) and *H. sulphurea*, Wallace.

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XI.—*Notes on the Dentition of* Rhinoceros.—*By* R. LYDEKKER, B. A.

(Received March 9th ;—Read June 2nd, 1880.)

(With Plate VII.)

A recent examination of the dentition of the fine series of skulls of *Rhinoceros indicus* contained in the collection of the Indian Museum, has brought to my notice several very interesting facts in regard to the development and serial homology of certain of the teeth of that and other species which I have thought of sufficient importance to be put on record, whence the following notes have been penned. My remarks will mainly refer to the dentition of *Rhinoceros indicus*, but some points relating to that of other species of the genus will be incidentally referred to in the course of the paper.

To illustrate my subject, I have had lithographed (through the courtesy of Mr. J. Wood-Mason) the left upper dentition of two adolescent skulls of *R. indicus*, from the collection of the Indian Museum, each of which is remarkable for an abnormality. The dentition exhibited in fig. 1 of the accompanying plate belongs to a young animal, and comprises two incisors ($i.^1$, $i.^2$), the milk-molar series ($m.m.^1$ to $m.m.^4$), and the true molars ($m.^1$ to $m.^3$), the last of which is still in its alveolus. The second specimen (fig. 2) belongs to a somewhat older animal, and exhibits the alveolus of an incisor ($i.^1$), two premolars ($p.m.^1$, $p.m.^2$), two milk-molars ($m.m.^3$, $m.m.^4$), and the three true molars ($m.^1$ to $m.^3$), the last of this series, in this instance also, not having yet cut the gum. The grounds on which these teeth are assigned to their respective serial positions will be found in the sequel.

The true molars (*m.*[1], *m.*[2], *m.*[3]) in all species of ***Rhinoceros***, whether living or extinct, are invariably three in number, corresponding with the typical mammalian series, and, therefore, require no further notice on this occasion. In advance of the first of the three true molars, there occur, in all young skulls of *Rhinoceros*, four teeth in serial apposition, but in older skulls there may be only three. It is to these anterior teeth of the milk-molar and premolar series (the one or the other present, according to the age of the animal) to which I now desire to draw attention.

An examination of the skull of which the left dentition is drawn in fig. 1, shows that, of the four teeth (*m.m.*[1], *m.m.*[2], *m.m.*[3], *m.m.*[4]) in advance of the first true molar (*m.*[1]), the three last (*m.m.*[2], *m.m.*[3], *m.m.*[4]) have their fangs and bases absorbed away by the germs of other teeth, which are succeeding them from above: there can, therefore, be no doubt that these three teeth are the three last milk-molars of the typical series. This is also shown by the last tooth of the anterior series (*m.m.*[4]) being more worn than the first of the true molar series (*m.*[1]): if the tooth preceding the latter were a premolar, it would be the less worn of the two. The first tooth of the whole series (*m.m.*[1]) shows, however, no signs of being about to be replaced by a vertically succeeding premolar. I have carefully examined another skull of the same age, in which the alveoli of the teeth have been opened, and I can find there no trace of a replacing premolar above the first of the seven teeth of the molar series. Were this tooth to be replaced by a premolar, such replacement would take place before that of the tooth next in the series. Several other adolescent skulls of *R. indicus* which I have examined show no trace of the replacement of the anterior tooth, and it may, therefore, be considered to be proved that in many instances no such replacement ever takes place.

From the development of the tooth in question with the milk-molar series (though it sometimes appears rather later than the next tooth), there would seem to be no doubt that it is the first of that series, and I shall show below that such is undoubtedly the case. From the fact of this tooth having in most instances no vertical successor and persisting for a considerable time during the period of use of the permanent dentition, it is not unfrequently referred to as the first premolar, and though, as I shall show, such a nomenclature is altogether inaccurate, yet it has a certain amount of convenience which may justify its conditional use.

The dentition drawn in fig. 2 also exhibits four teeth in front of the first true molar (*m.*[1]), but they are not all homologous with those in the preceding specimen. The two teeth (*m.m.*[3], *m.m.*[4]) in advance of the first true molar (*m.*[1]) in fig. 2 are more worn than the former, and will consequently be the third and fourth milk-molars, or the homologues of the corresponding teeth in fig. 1. The first and second teeth (*p.m.*[1], *p.m.*[2]), however, in fig. 2 are still in germ, and as being totally unworn must be of a later development than the third and fourth milk-molars: consequently, the former must be the first and second premolars, which have replaced the first and second milk-molars. In this instance, therefore, the first milk-molar, which, as we have seen, is normally persistant, has been replaced by a vertically succeeding premolar, from which replacement there can be no question as to the correctness of the serial position assigned to the former tooth. The replacing premolar (fig. 2, $p.m.^1$,) is of considerably larger size and more complex structure than the replaced milk-molar (fig. 1, $m.m.^1$).

In the lower jaws of all the skulls of *R. indicus* which have come under my notice, I cannot find any instance of the vertical replacement of the first milk-molar, which generally persists until the permanent dentition is well in wear, and subsequently falls out at a comparatively early period. Neither can I find any instance of the replacement of the first milk-molar of either jaw in *R. sumatrensis* (*sumatranus*) or *R. javanicus* (*sondaicus*).

The formula of the molar dentition of *R. indicus*, taking into account the abnormal form, may be written as follows:—$m.m.\ \frac{4-4}{4-4}\ p.m.\ \frac{(3\cdot4)-(3\cdot4)}{3-3}\ m.\ \frac{3-3}{3-3}$; the adult molar dentition of the normal form, $m.m.\ \frac{1-1}{1-1}\ p.m.\ \frac{3-3}{3-3}\ m.\ \frac{3-3}{3-3}$; and of the abnormal form, $m.m.\ \frac{0-0}{1-1}\ p.m.\ \frac{4-4}{3-4}\ m.\ \frac{3-3}{3-3}$.

The succession and homology of the anterior tooth of the molar series appears to have given rise to a certain amount of confusion among naturalists. Thus Professor Huxley when treating of the dentition of the genus *Rhinoceros*, observes:* "Of the four milk-molars, the first, as in the Horse, is smaller than the others, and is not replaced;" two pages back in the same work, however, the Professor gives the formula of the premolars as $\frac{4-4}{4-4}$, which would imply either that the first tooth of the molar series is replaced, or else that it is reckoned as a premolar, in which case there would be only three milk-molars.† Professor Owen appears to have come to a conclusion totally opposite to that of Professor Huxley, and seems to consider that the first milk-molar is always replaced. Thus on page 592 of his 'Odontography' the Professor observes that "the first of the

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* 'Anatomy of Vertebrated Animals,' p. 362.

† In a work explanatory of the homology of the teeth, as is Professor Huxley's, there can be no doubt that this homology should be given with the most strict accuracy. In descriptive zoology and palæontology, however, it will still be convenient, in referring to the dentition of the genus *Rhinoceros*, to count the first milk-molar, when persistent, as a premolar, in order to avoid introducing another term into the dental series. The same conventional arrangement may be adopted in regard to the permanent and milk-incisors, referred to below.

permanent series of seven molar teeth is very small in both jaws, and is soon shed;" and again on page 599, "the first milk-molar soon yields place to the first premolar." The above given instances of the dentition of *R. indicus* show that this view cannot be normally correct: the difference in the form of the first upper milk-molar (*m.m.*^{1}) and the first premolar (*p.m.*^{1}) shows, in cases where the former tooth persists, that it cannot be a premolar which has supplanted a milk-molar *in utero*, as might otherwise be the explanation according to Professor Owen's views.

I now come to the consideration of the non-molar dentition, and shall first treat of the teeth of the upper and secondly of the lower jaw.

According to Professor Owen,[*] there is developed in the fœtal skull of *R. indicus*, immediately behind the maxillo-premaxillary suture, a very small tooth, which, from its position must be the milk-canine: this tooth disappears at an extremely early age, and no permanent successor is ever developed. I can find no record of an upper canine ever having been observed in the fœtus of any other species of the genus, and no permanent upper canine occurs in any species.

In a very young skull of *R. indicus*, figured by Cuvier,[†] there appear in the premaxilla the alveoli of two teeth, which must be those of the first and second milk-incisors. Two, indeed, appear to be the normal number of upper milk-incisors developed in the genus, though Professor Huxley[‡] speaks of there being three on either side in some species.[§]

Normally, in *R. indicus* there is only one permanent incisor developed, succeeding the first (innermost) milk-incisor; the former tooth is easily recognized by its lateral elongation. Occasionally, however, as in the skull of which the left upper dentition is represented in fig. 1, a second upper incisor (*i.*^{2}) is developed, replacing the second milk-incisor. In the figured specimen, the two incisors (*i.*^{1}, *i.*^{2}) are still in the condition of germs just protruding from their alveoli; from the condition of wear of the molar series it is quite evident that the two incisors belong to the second series, which is also shown by the characteristic form of the innermost (*i.*^{1}); the second incisor (*i.*^{2}) is not lengthened laterally like the first. In the right premaxilla of the same skull, only the first incisor is developed. Another instance of the development of the second incisor of one side of the upper jaw is afforded by the skull belonging to a mounted skeleton of an old individual of *R. indicus* in the Indian Museum, in which all the teeth of the permanent series are much worn. In the right premaxilla of that skull there occur two large and well-worn permanent incisors not differing to such an extent in size as do those of the figured specimen. No trace of a second incisor is to be found in the left premaxilla, and I cannot, indeed, find any instance of the development of the two upper incisors of both sides in the same individual of *R. indicus.* The occasional development on one side only of the second permanent incisor in the last-named species, would seem to be a pretty clear indication that it is descended from an ancestor in which two pairs of upper incisors were normally present. It seems, indeed, that, when teeth normally absent do present themselves, they usually appear only on one side, as in the instance of the lower jaw of a tiger with an extra premolar, described by myself in a former volume of the Society's Journal.*

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[*] 'Odontography,' p. 592.

[†] 'Ossemens fossiles,' Ed. 1836. Atlas, pl. xliii, fig. 3.

[‡] Loc. cit. p. 362.

[§] I am not aware which species is referred to.

In all species of the genus, the normal number of permanent upper incisors (if any are present) appears to be one only on either side, and I have not come across any instance of the abnormal development of the second upper incisor in any species but *R. indicus.* It may not improbably be, however, that such abnormal development may occur in other species.

It has, indeed, been stated on the authority of the late Dr. Falconer† that the extinct Indian *R. sivalensis* was furnished with three pairs of upper (and lower) permanent incisors; none of the numerous specimens of the skull of this species figured in the 'Fauna Antiqua Sivalensis,' however, exhibit any incisors at all, and we have, therefore, no tangible evidence whatever to support the new genus *Zalabis* lately proposed by Professor Cope‡ for the reception of this species on the ground of the unusual number of incisors with which it was provided.

Turning now to the lower jaw, we shall find that there is some considerable difficulty in arriving at a satisfactory conclusion as to the homologies of the teeth in advance of the molar series.

In *R. indicus,* there normally exist in the young animal an inner pair of very small conical teeth, and an outer pair of larger teeth. The outer pair are succeeded from below by a pair of much larger triangular and pointed teeth, which, therefore, evidently belong to the permanent series. Normally, I believe, the inner pair are not succeeded by permanent teeth, as I can find no trace of such in most lower jaws; in the lower jaw of the skull drawn in fig. 1, however, there occurs, a little above and internal to the middle pair of teeth, a second pair of small teeth, which are less protruded from the jaw, and which, I think, certainly belong to the second dentition.

* Vol. xlvii, pt. ii, pl. 2.

† Owen, loc. cit. p. 589.

‡ Bul. U. S. Geol. Geog. Surv. Vol. v, p. 229.

We may, therefore, say that in *R. indicus* there are always developed in the symphysis of the mandible two pairs of milk-teeth, and always one, and occasionally two pairs of permanent teeth. When the middle pair of milk-teeth are not replaced, they remain during the permanent dentition, as in the analogous case of the first upper milk-molar.

It now remains to consider the serial position of the teeth in question. With regard to the middle pair of teeth, there can be no question but that they are incisors, and probably the first of that series. With regard to the homology of the larger outer pair of teeth, two views are entertained. By the older writers, this pair of teeth were unhesitatingly classed as incisors; a view adopted both by Prof. Huxley and by Prof. Owen. Latterly, however, some writers, among whom may be mentioned Professors Cope* and Gaudry,† have come to the conclusion that this outer pair of teeth are really canines, apparently from their resemblance to the undoubted canines of certain genera of extinct Mammals. To distinguish between a canine and an incisor tooth in the lower jaws of animals in which the incisors are reduced and no upper canine is present, is indeed a matter of extreme difficulty, and I do not desire on the present occasion to enter into the reasons either for or against the innovation. I provisionally, however, adopt the old nomenclature.‡ With this view of the homology of the teeth in question, the anterior milk dentition of *R. indicus* may be formulated as follows:—$c.\,\frac{1-1}{0-0}\;i.\,\frac{2-2}{2-2}$, the adult dentition will be normally $c.\,\frac{0-0}{0-0}\;m.i.\,\frac{0-0}{1-1}\;i.\,\frac{1-1}{1-1}$, or abnormally $c.\,\frac{0-0}{0-0}\;i.\,\frac{2-2}{2-2}$.

In treating of the milk dentition of *Rhinoceros*, Professor Huxley§ remarks of the two pairs of lower incisors that "it seems probable that only one pair, in *any case*, are permanent teeth." I have shown that occasionally in *R. indicus* both pairs may be replaced by permanent teeth, and I now proceed to show that such is at all events sometimes the case in another species. In a lower jaw of *R. javanicus* figured by De Blainville,‖ there are the germs of two incisors on each side *in alveolo*, below protruded incisors; the former, therefore, are clearly permanent teeth. I have no means of knowing whether this replacement is abnormal or normal. In

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* Loc. cit.

† 'Les Enchainements du Monde Animal: Mammifères Tertiaries,' p. 50, et seq.

‡ I may perhaps observe that there seems to be some discrepancy in M. Gaudry's nomenclature, since on page 58 of his work quoted above, he speaks of there being two pairs of small incisors in the lower jaw of *R. bicornis (africanus)*, and yet does not produce any evidence to show that these teeth are not the homologues of the two pair of teeth in the mandible of *R. indicus*, which are reckoned as incisors and canines.

§ Loc. cit. p. 362.

‖ 'Ostéographie,' Atlas, Rhinoceros, pl. viii.

R. sumatrensis, there is in the adult state no median pair of lower incisors,* and it is, therefore, probable that permanent middle lower incisors are never developed in this species.†

In the living African species of *Rhinoceros*, in the extinct Indian *R. deccanensis*, and other extinct species, no permanent incisors, in either jaw, were ever developed, and in the adult the symphysis of the mandible and the premaxillæ are consequently edentulous. It has been said that three pair of lower incisors were developed in *R. sivalensis*, but none of the lower jaws of the genus figured in the 'Fauna Ant. Siv.' show more than two pairs of these teeth, and none are present in the specimen referred to *R. sivalensis*.

From the foregoing brief notes it will be gathered that the dental system of the genus *Rhinoceros* presents very considerable differences in different species, and occasionally in different individuals of the same species. These differences are mainly due to the varying extent to which specialization has operated in the genus, and to the occasional development by 'reversion' of teeth normally absent.

The genus *Rhinoceros* (using the term in its original comprehensive sense) is indeed one of those in which the dental system may be said to be in a condition of change, and this variability in the matter of the development or suppresion of certain teeth in species and individuals, appears to me to render the splitting up of the old genus into a number of new genera or subgenera (except in the case of *Acerotherium*) a very questionable measure. The relative prominence or insignificance of the anterior teeth may be traced in a graduated scale from one species to another as has been most ably done by M. Gaudry in his invaluable work already quoted in this paper.

EXPLANATION OF PLATE VII.

Fig. 1. The left upper dentition of an immature specimen of *R. indicus*, showing the germs of two permanent incisors ($i.^1$, $i.^2$), four milk-molars ($m.m.^1$, $m.m.^2$, $m.m.^3$, $m.m.^4$), first and second true molars ($m.^1$, $m.^2$), and the alveolus of the third ($m.^3$). (The animal to which this skull belonged was killed by Mr. W. T. Blanford.)

Fig. 2. The left upper dentition of a somewhat older individual of the same species, showing the alveolus of the first permanent incisor ($i.^1$), the first and second premolars ($p.m.^1$, $p.m.^2$), the third and fourth milk-molars ($m.m.^3$, $m.m.^4$), the first and second true molars ($m.^1$, $m.^2$), and the alveolus of the third ($m.^3$).

Both specimens are drawn one half the natural size.

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* Professor Cope (loc. cit. p. 229) is in error when he gives two pairs of mandibular teeth to this species.

† I should doubt if the lower jaw drawn in fig. 15 of plate 138 of Owen's 'Odontography' as of *R. sumatrensis* belongs to that species.

XII.—*On a Species of* Trochalopterum *from Travancore.*

By W. T. Blanford, F. R. S.

(Received Sept. 2nd ;—Read November 3rd, 1880.)

A very interesting series of bird-skins obtained in Southern Travancore has recently been brought to England by Mr. F. W. Bourdillon. Collections previously made by the same gentleman in the locality named have been described by Mr. Hume in Stray Feathers, Vol. IV, p. 351, and Vol. VII, p. 33. One of the species noticed in the second paper is *Trochalopterum fairbanki*, a bird originally obtained by Mr. S. Fairbank on the Palni hills, about 100 miles north of the range, east of Trevandrum, on which Mr. Bourdillon's skins were collected. Mr. Hume, l. c. p. 37, points out some differences between the Travancore and Palni forms, but remarks that he has not a sufficient series to determine whether these differences are constant.

In the collection now brought are three skins of the Travancore *Trochalopterum*, and on comparing them with the original type of *T. fairbanki* in the British Museum, I find, besides the differences noticed by Mr. Hume, a few other distinctions, sufficient, I think, to justify a separate title being bestowed on the Travancore bird. The following is a full description of the latter.

Trochalopterum meridionale, sp. nov.

T. Trochaloptero fairbanki *peraffine, sed dorso grisescente, abdomine medio albo, supercilio albo haud post oculum producto, regione postoculari grisea nec fusca, rostroque robustiore distinguendum : pileo brunneo, dorso griseo-olivaceo, postice olivaceo, coloribus transeuntibus ; supercilio brevi albo, loris brunneis, cum pileo concoloribus ; capitis lateribus cum regione parotica pallide rufescenti-griseis, colli lateribus cinereis ; rectricibus remigibusque brunneis, illis remigibusque secundariis ultimis subobsolete transfasciatis ; mento, gula, atque pectore albescenti-griseis, conspicue fusco-striatis, media gula fere alba ; abdomine medio albido, lateribus cum pennis subcaudalibus tectricibusque inferioribus alarum ferrugineis, tibiis olivaceis ; rostro nigro, pedibus fuscis, iridibus saturate rufis.*

Long. tota exempli masculini 9, alæ 3·5, caudæ 3·6, tarsi 1·45, rostri a fronte 0·8, ejusdem a rictu 1, culminis 0·9 poll. Angl.

Hab. In summis montibus provinciæ Travancore, ad extremitatem meridionalem peninsulæ Indicæ.

Head above hair-brown, the feathers rather pale-shafted, the colour passing gradually into that of the back, which is greyish olive, becoming greener on the rump ; a very short white supercilium, only extending from the base of the bill to above the middle of the eye; lores the same colour as the crown; sides of head, including the ear-coverts, grey, with a slight rufescent tinge; sides of neck purer grey; wing and tail-feathers brown with olivaceous margins, all the tail-feathers and the last (proximal) secondary quill-feathers with faintly marked narrow transverse bars on the upper surface; chin, throat, and breast pale grey, with conspicuous dusky striæ, the central portion of each feather being much darker than the edges; the middle of the throat is very pale, almost white, middle of abdomen white, lateral portions and flanks with the under tail-coverts and under wing-coverts ferruginous; thigh-coverts olivaceous. Irides dark red,* bill black, legs dusky.

The three specimens were all shot at an elevation of 4000 feet. Two are from Mynall, one from the Travancore and Tinnevelly boundary. Two are males; of the third, the sex has not been ascertained. The differences in measurement are trifling: the wing is 3·4 to 3·55 inches; tail, 3·4 to 3·65; tarsus, 1·4 to 1·45; culmen, 0 9 to 0·95. The length is given by Mr. Bourdillon from 8½ to 9½ inches in different specimens.

T. meridionale is distinguished from *T. fairbanki* by (1) the much shorter white superciliary stripe terminating above the eye, whereas, in *T. fairbanki*, it extends back above the ear-coverts; (2) by there being no brown band behind the eye, the feathers immediately behind the eye being rufescent grey like the cheeks in *T. meridionale*, whilst they are brown like the lores and the crown in *T. fairbanki*; (3) by the back and upper parts generally being much greyer and by the brown colour of the crown passing gradually into the olivaceous tinge of the back and not being separated by a distinct margin; (4) by the tail-feathers being browner and more distinctly transversely barred above; (5) by the striation on the throat and breast being more strongly marked; (6) by the middle of the abdomen being white instead of ferruginous†; and (7) by the rather stouter bill. I consider the differences marked 1, 2, and 3 characteristic; the others taken alone would scarcely justify the separation of the two forms.

From *T. jerdoni* the present species may be known by the absence of a black chin‡, by the flanks and under tail-coverts being rufous instead of olivaceous, and the middle of the abdomen white instead of rufous. It is greatly to be regretted that *T. jerdoni* has never been collected again, so far as can be judged by published accounts, since Jerdon first procured it.

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* Noted by Mr. Bourdillon, as also are the dimensions taken in the flesh. The length above quoted is from these measurements.

† This may not be constant; I have an indistinct recollection of having seen a specimen of *T. fairbanki* with the middle of the abdomen whitish, but I am not sure.

‡ With reference to this distinction between *T. jerdoni* and the two Southern forms *T. fairbanki* and *T. meridionale*, it is as well to note that the presence of a black chin in the former is mentioned by Blyth in his original description J. A. S. B., 1851, xx, p. 522. I call attention to this distinction, as Mr. Hume has overlooked it in his note on the species (Stray Feathers, vii, p. 36).

XIII.—*On a new Species of* Papilio *from South India, with Remarks on the Species allied thereto.*—*By* J. Wood-Mason, *Officiating Superintendent, Indian Museum, and Professor of Comparative Anatomy and Zoology, Medical College, Calcutta.*

(Received Oct. 16th;—Read Nov. 3rd, 1880.)

(With Plates VIII and IX.)

In December last, the Indian Museum received from Mr. F. W. Bourdillon of Trevandrum, a small collection of diurnal Lepidoptera, amongst which was a much worn and tattered example of a female insect evidently closely allied to the North Indian *P. Castor* and to the Burmese *P. Mahadeva*, with the same sex of the latter of which it turned out on examination to agree in having the discal markings of the hind-wing confined to the median region of the organ, where they form a transverse band of lanceolate spots, instead of being diffused over the whole disk and extending into the cell, as in the former.

About a month ago, a few species of butterflies were received from Mr. G. H. Kearney of the Berkodee Coffee Estate, Koppa Anche, Mysore, and amongst them is a fine specimen of the male, which proves that the species is, as the above-mentioned female specimen had already indicated, more nearly related to *P. Mahadeva* than to *P. Castor*, and enables me to describe it.

Papilio Dravidarum, n. sp., Pl. VIII, Fig. 1, ♂.

Allied to *P. Castor* and to *P. Mahadeva*,[†] but more closely so to the latter, with which it agrees in the form of the wings in both sexes.

Sexes alike, having not only the same form of wings but also the same general type of coloration as the females of the two described species; the male differing from the female only in the darker and richer tints of its upper surface.

♂. Upperside rich fuscous of a much lighter shade than in *P. Castor*, or even than in *P. Mahadeva*, and more densely powdered with fulvous scales than in either. *Anterior wing* with the basal area of a richer and darker shade of brown than the rest of the organ; with four distinct longitudinal lines of fulvous scales in the cell, at the extremity of which is a minute but distinct cream-coloured speck; with the outer portion beyond

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[*] Moore, P. Z. S. 1878, p. 840, pl. li, fig. 1.

the cell very densely covered with fulvous scales between the veins; with a marginal row of ochraceous-white spots placed at the incisures; and with a submarginal series of nine conical or sublanceolate ochraceous ones; each series decreasing at either end and paling towards the costal margin. *Posterior wing* with the anterior third of its surface devoid of fulvous scales; with the incisures of the outer margin very narrowly edged with ochraceous-white; with a sub-marginal series of seven strongly and angularly curved lunules or arrow-shaped spots, the four posterior of which are ochraceous-white, and the three apical ones cream-coloured; and with a discal band of seven externally-dentate lanceolate cream-coloured spots all irrorated with fuscous scales except the anterior two; with the cell and the parts of the wing-membrane external and internal to it tolerably thickly sprinkled with fulvous scales. The wing-membrane being in *both wings* devoid of fulvous scales in the intervals between the sub-marginal and incisural markings presents the appearance of having a sub-marginal row of dark blotches. UNDERSIDE less richly and deeply coloured, with the markings, especially the spot at the end of the cell, all slightly larger and white, with the exception of the discal series of the hind-wing, which are tinged with cream-colour at their inner points; and with the fulvous scales similarly though not quite so thickly distributed over the fore-wing, but evenly sprinkled over the whole of the hind-wing. Body lighter-coloured than in *P. Castor*, but marked in identically the same manner.

Length of fore-wing 2·2; whence expanse = 4·5 inches.

HAB. Koppa Anche, Kadur District, Mysore, S. India, at about 2,500 feet elevation. Obtained by Mr. G. H. Kearney.

♀. Marked above and below, spot for spot, as in the male, but lighter and less richly coloured, with the spot at the end of cell larger and apparently more distinctly visible on the upper side, and with all the markings (except the sub-marginal series of the underside of the hind-wing, which are white) straw-coloured.

Length of fore-wing 2·3; whence expanse = 4·7 inches.

HAB. Trevandrum. Obtained by Mr. F. W. Bourdillon.

In the male of *P. Dravidarum*, there are visible upon the upper surface of the fore-wing a spot at the end of the cell, a sub-marginal row of conical or sub-lanceolate spots, and a marginal row of incisural spots; and upon that of the hind-wing a discal row of lanceolate spots, a sub-marginal series of lunules, and incisural spots as in the fore-wing.

In the male of the darker-coloured *P. Mahadeva*, the incisural spots of the fore-wing alone remain, but the hind-wing retains its three series of spots, which, however, are all smaller and apparently less clouded with dark scales than in the preceding species.

In the fuscous-black male of *P. Castor*, the fore-wing may be said to be uniform black, the incisural spots, which alone remain, being so reduced in size as to be barely visible, being, in fact, mere specks confined to the fringe; the hind-wing has lost all but the incisural specks (which are similarly confined to the fringe) and the first three or four spots of the discal series, which together form a large and conspicuous cream-coloured blotch divided by the veins: *P. Castor* may, in fact, be described as a rich dead-black insect with a conspicuous cream-coloured blotch near the outer angle of each hind-wing.

In *P. Castor*, then, the sexes are, as regards colour and markings, as strongly differentiated from one another as in any species with which I am acquainted; they also differ to some extent in form, the male having the fore-wing narrower, with the external margin obviously emarginate, and the hind-wing also narrower and produced, with the same margin more deeply incised and lobed than in the female, both pairs of whose wings in form more or less closely* resemble those of both sexes in the other two species.

In *P. Mahadeva*, the sexes are also tolerably well, though not so conspicuously, differentiated in point of colour and markings as in *P. Castor*, but not at all in form, the wings being of the same shape in both sexes.

In *P. Dravidarum*, the sexes agree perfectly both in form of wings and markings, differing very slightly in colour only; so that but little sexual differentiation has here taken place.

The female of *P. Dravidarum* is scarcely distinguishable, as far as one can tell from a description alone, from that of *P. Mahadeva*, the only differences that I can make out being that in the latter "the fore-wings have very small and less distinct sub-marginal white spots, and no spot at the end of the cell." From that of *P. Castor*, however, it is readily distinguished by having, as I have already pointed out, the discal markings of the hind-wing in the form of a transverse band of short lanceolate spots.

At the meeting of the Linnæan Society of London held on the 18th March last, a paper by Prof. Westwood, on a supposed polymorphic butterfly from India, was read. In this memoir the following conclusions are said (*vide* abstract in 'Nature' Vol. XXI, p. 531, April 1st, 1880) to have been arrived at by the author:—(1) "That *Papilio Castor* is the male of a species whose females have not yet been discovered; (2) that the typical *P. Pollux* are females of which the males with rounded hind-wings having a diffused row of markings has yet to be discovered; and (3) that the coloured figures given by the author represent the two sexes of a dimorphic form of the species."

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* The females present an inconspicuous dimorphism, some having retained the primordial form of hind-wing, while others have the outer margin of this wing toothed as in the male (*vide infra*).

With regard to the last of these conclusions I cannot speak, because neither the paintings nor the specimens in question are accessible to me; but, having spoken above as if the opposite sex of *P. Castor* were perfectly well-known to naturalists, while, according to Prof. Westwood, it is still undiscovered, I ought perhaps to say a few words about the material on which my remarks are based.

Papilio Castor is restricted in its distribution to the slopes and valleys of the hill-ranges of North Eastern India and to the parts of the plains in immediate contiguity with them; its place being taken elsewhere, as in Southern India, by the new species described in the preceding pages, and, in Burmah, by *P. Mahadeva.* The Indian Museum possesses specimens from the Southern slopes of the Khasi Hills (Silhet), from the Sikkim Hills (Darjiling), Cherra Punji in the Khasi Hills, and the Naga Hills; and three males were taken by Lieut.-Col. Godwin-Austen during the Dafla Expedition; in these last, in a large male from Cherra Punji, and in two specimens of the same sex from the Naga Hills the upper surface is dark brown of a much lighter tint than in nine males recently received from Sikkim (2) and Silhet (7), which are all brown-black of so dark a shade as to appear quite black except when a strong light falls upon them when their colour appears brownish; in fact, the brown of the former is to that of the latter series of specimens what dark green is to the colour known as "invisible-green." In the large Cherra Punji specimen, the short tooth, or rudimentary tail, into which the third branch (*d.*^{3}, pl. ix, fig. 1) of the median vein of the hind-wing is usually produced, does not extend beyond the line of the other lobes of the outer margin, and one of the three dwarfed winter specimens* captured by Col. Austen approaches it in this respect; moreover, one of the Silhet specimens has this tooth smaller in one wing than in the other, so that this, like secondary sexual characters in general, is subject to variation. It is possibly to difference of station, but probably to long exposure to the vicissitudes of the Calcutta climate, and to the applications of benzine and other noxious substances to which they were subjected before I took over charge of the collection of Lepidoptera, that these brown specimens owe their lighter coloration. However this may be, it may confidently be asserted that it would be impossible for the most inveterate species-maker to discover any character by which to separate them as a distinct species or race from the fresh and consequently dark Sikkim and Silhet specimens. So much for the males.

Of the nine females in the collection referred by me to *P. Castor*, seven being perfect can readily be divided into two sets according to the form of the outer margin of the hind-wing—three (one from Assam, one from Cherra Punji,* and a large one from Silhet) having the third branch ($d.^3$, pl. viii, fig. 2) of the median vein not produced and the outer margin of the wing consequently 'rounder,' being, in fact, typical *P. Pollux*—and four (two from Silhet† and two from Sikkim‡) having that veinlet produced into a small tooth ($d.^3$, pl. ix, fig. 2) as in the male. I consider that these two different forms are both females of *P. Castor*, and that the slight differences they present are explained on the supposition, warranted by numerous analogous facts in nature, that the secondary sexual characters acquired by the male have been partially transmitted to some females but not to others (*P. Pollux*), which have retained the primordial rounded form of wing.

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* The insect figured by Westwood (Arcana Entom. vol. ii, pl. 80, fig. 2) seems to have been a similarly dwarfed and faded individual.

The fact that the discoidal markings of the hind-wing in the two Silhet females with toothed wings are lighter and more distinctly cream-coloured than in any of the females with rounded wings; that the malformed specimen from the same locality (which certainly belongs to the form with toothed hind-wings) has these markings in the fourth, fifth, and sixth interspaces, those, that is to say, corresponding to the ones forming the principal part of the blotch in the male, of almost as rich and pure a colour as in that sex; and that one of the two former has the spot at the end of the cell and the submarginal markings of both fore-wings obsolete and is thus still further approximated to the male; do certainly seem to me to tell rather for than against the above supposition.

The *Helenus*-group of Papilios, to which *Papilio Castor* and its allies unquestionably belong, taken as a whole, presents us with a remarkable series of gradations in the amount of difference between the sexes, comprising as it does: one species (***P. Dravidarum***) in which the sexes closely resemble one another in the form of the wings and in colour and markings, and there is only an incipient sexual differentiation: another (***P. Mahadeva***) in which, while agreeing in structure, they differ to a considerable extent in markings and colour, and the secondary sexual characters of the male are much more pronounced: another (***P. Castor***) in which they differ from one another to such a remarkable extent that no lesser an authority than Prof. Westwood originally described them under different names and still maintains their distinctness, and Mr. Wallace* placed them in different groups of the genus; the male having acquired the most pronounced secondary sexual characters (including rudimentary tails), which have been partially transmitted to some females but not to others; and the two forms of female having retained, one of them the form of wings, and both the general style of colouring, characteristic of both sexes in the first-named species: and, finally, others (***P. Helenus***, ***P. Chaon***, etc.) in which the male has perfectly transmitted to the opposite sex all the secondary sexual characters (including the long tails) that he had acquired, the female only differing from him in such trifling points as the lighter coloration of the outer half of both wings and the dingier shade of her upper surface generally.

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* There is another specimen from Cherra Punji, the largest of all in the collection, with the outer margins of its hind wings so ragged that it is impossible to be quite sure to which form it belongs, though, from its close agreement in other respects with Westwood's figure in the 'Arcana' as well as with the other insect from the same locality, I should say it is a typical *P. Pollux.*

† There is a third specimen from Silhet in the collection, taken at the same time and place as the other two, but it unfortunately has the hind-wings symmetrically malformed at their outer margins, the third lobule on each side being short and angulated and the fourth being somewhat longer than usual and also angulated. This malformation is interesting as showing in the same specimen the instability of this character, the strong tendency to the assumption of the male form of wing exhibited in the lengthening of the lobule next in order, and the unmistakable 'reversion' to the rounded form of wing in the suppression of the rudimentary tail.

It should be mentioned that a gynandromorphous example of the form of female described by Prof. Westwood as *P. Pollux* has been figured and described as *P. Castor* by G. Semper in Wien. Entom. Monatschr. 1863, Band vii, p. 281, Taf. 19. In this specimen both the wings of the left side are truly female, but on the opposite side the posterior portion of the fore-wing from the first discoidal veinlet to the inner margin on the upper side only, and the anterior portion of the hind-wing from the costal margin to the second branch of the sub-costal on both sides, exhibit the masculine livery not unmingled with female characters (*Conf.* Westwood in Thes. Ent. Oxon. p. 187).

‡ The two Sikkim specimens have the tooth less developed and the discal markings of the hind-wings exactly like those of the other form *(P. Pollux).*

From these and other facts, we are, I think, entitled to infer the probable descent of all the members of this group from an ancestor with tailless, rounded wings in both sexes, closely resembling ***P. Dravidarum***, but with diffused discal markings in the hind-wings and probably also in the fore-wings; the conspicuous wing-blotches of ***P. Helenus***, ***P. Castor***, etc., having apparently resulted from the concentration, so to speak, of such diffused colouring in the direction of the breadth of the wing, just as have the discal bands of short spots in ***P. Dravidarum*** and ***P. Mahadeva*** from a similar process of modification in the opposite direction.

If his conclusions are correctly reported, Prof. Westwood's drawings must represent a species different from either of those alluded to herein, and I look forward with much interest to the appearance of his paper.

EXPLANATION OF THE PLATES.

Plate VIII.

Fig. 1. *Papilio Dravidarum*, W.-M., ♂.
Fig. 2. *Papilio Castor*, Westw. ♀ 2nd Form (*P. Pollux*, Westw.), from Silhet.

Plate IX.

Fig. 1. *Papilio Castor*, Westw. ♂, from Silhet.
Fig. 2. —— —— ♀ 1st Form, from Silhet.
$d.^3$ = third branch of the median vein.

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* In his well-known memoir 'On the Phenomena of Variation and Geographical Distribution as illustrated by the *Papilionidæ* of the Malayan Region' in Trans. Linn. Soc. Lond., vol. xxv, pp. 33, 34.

XIV.—*Description of the Female of* Hebomoia Roepstorffii. *By* J. Wood-Mason.

(Received October 27;—Read November 3rd, 1880.)

Hebomoia Roepstorffii.

H. Roepstorffi, Wood-Mason, antea, p. 134, ♂.

♀. Upperside. *Fore-wing* with the orange patch devoid of amethystine gloss, externally more broadly bordered with fuscous (which at each veinlet gives off inwards an angular process the extremity of which is continued on as a very narrow edging to each side of the veinlet), but internally much less distinctly so than in the male; with the cell more clouded with dark scales; and with the sulphur-colour at the inner angle more diffused. *Hind-wing* with a marginal row of large subtriangular fuscous spots placed upon the veinlets from the first subcostal to the first median (the two last obsolete), decreasing from the second in the direction of the anal angle, and connected together at the extreme margin of the wing by a narrow edging of the same colour, which extends to the anal angle; with a submarginal series of six roundish spots, similarly decreasing from the first, and alternating with those of the marginal series, each being placed upon a fold, the first and largest on the fold between the costa and the first branch of the subcostal, and the last on that between the first and second median veinlets; and with the sulphur-colour around the four intermediate submarginal spots stained with orange. Underside of *both wings* paler.

Length of fore-wing 1·7; whence expanse = 3·5 inches.

Hab. South Andaman.

Described from a specimen in the collection of Captain G. F. L. Marshall, R. E., who courteously offered me the loan of the insect for description as soon as he had seen the description of the male published in the last number of this Journal.

In Captain Marshall's specimen of the male the submarginal spots of the fore-wing are obsolete.

XV.—*Notes on and Drawings of the Animals of various Indian Land Mollusca* (Pulmonifera).—*By* LIEUT.-COL. H. H. GODWIN-AUSTEN, F. R. S., F. Z. S., &c.

(Received July 15th;—Read Nov. 3rd, 1880.)

(With Plates X and XI.)

Previous to his appointment to the Yarkand Mission, Dr. F. Stoliczka had been working for some years at the animals of the Indian land Mollusca, and had enriched this Journal with many valuable papers. Among the numerous MSS. he left behind him in Calcutta, there were found, after his death, some very excellent drawings that had been made under his superintendance from the living animals; they had been drawn on scattered sheets of paper, and remarks on the colour and other characters of the soft parts had been made in pencil on the margins, which were fast becoming illegible. I, therefore, with the concurrence of Dr. J. Anderson, pasted these interesting drawings into a scrap-book* and copied into it, as well as I was able to decipher them, the names, localities, and remarks noted.

As it may be some years before many of these species are obtained again by any naturalist with the means or talent to correctly draw them, I have thought that lithographed copies published in this Journal would not only be preserving, but in a measure carrying out the work of so good an observer, and would be of use to those in India who are interested in the land-shells of the country. There is an immense amount of work to be done in this particular branch of Natural History. We know as yet very little of the relationship of the many species, especially among the *Zonitidæ* (Semper); the anatomy of most of them has never been examined, and, until this is done, or at least more careful descriptions and sketches of the outward form of the animals are made, our attempts at a satisfactory classification must fail.

I have to each species figured given Stoliczka's remarks and identifications in full, and added a few notes extracted from my field-book wherever I could do so, and I also distinguish a few identifications by Messrs. W. T. Blanford and Geoffrey Nevill.

The plates that will be given contain species of the family *Zonitidæ* variously assigned to the genera *Ariophanta*, *Hemiplecta*,† *Rhysota*, *Xesta*, and *Rotula*; and one plate has been required for the *Helicidæ* of such very different genera as *Plectopylis*, *Fruticicola*, &c; those of the genus *Macrochlamys*, I have also copied, but as I am engaged on a paper treating of this group more in detail, which I propose to send to the Zoological Society of London, the plate will I hope appear in the Journal of that Society.

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* In the Library of the Indian Museum, Calcutta.

† *Oxytes.*

Genus ARIOPHANTA, Des Moulins.

Bull. Soc. Bord. III, p. 227, (Nov. 1829).

With plate giving three figures of shell and two of the animal from life; type *lævipes*, Müller, Bombay.

The description by Albers (Die Heliceen, p. 62, 1860) is as follows: "Testa sinistrorsa, umbilicata, tenuis, diaphana; anfractus ultimus angulatus vel carinatus; apertura obliqua, lunaris, peristoma simplex, acutum, margine columellari reflexo"; in the sub-genus, thus defined by shell alone, this writer places the following species:—

himalayana, Lea = **interrupta**, Bs.	Bengal.
lævipes, Müll.	Bombay.
retrorsa, Gould (*Hemiplecta*, Sect. E of Theobald)	Tavoy.
janus, Chem.	Malacca.
rumphii, v. d. Busch.	Java.

Adams adds to these:—

ryssolemma, Albers (? *Thyreus*, Bs.)	Java?
trifasciata, Chemn, = *lævipes*, var.	Malabar.

and he figures *lævipes*, quoting M. E. Gray, Fig. Moll. Anim. pl. 288, fig. 7, which is a trace of Des Moulins' original drawing (l. c.).

Mr. Geoffrey Nevill, in his Hand-List of Shells in the Indian Museum Calcutta, adds to the above:—

laidlayana, Bs.	Lower Bengal.
kadapaensis, Nevill,	Madras.

= *nicobarica*, Chemn. re-named, as it is not found in the Nicobar Islands.

cysis, Bs.	Nilgiris.
thyreus, Bs.	Nilgiris.
intumescens, W. T. Blf.	Bombay.
immerita, W. T. Blf. (in coll. Beddome)	South Canara.

near *interrupta*.

cambojensis, Reeve	Siam.
regalis, Bs.	Borneo.

= *vittata*, Adams and Reeve, (*vide* Adams. Gen. Moll. pl. lxxix, fig. 5, as *Nanina*).

bajadera, Pfr. = *ammonia*, Valenciennes	Bombay.

Mr. William Theobald (Cat. Land and Freshwater Shells of Brit. India) includes—

auris, Pfr. (? *cysis*, Bs.)	Kundah Hills, Madras.
cyclotrema, Bs.	Sumeysar Hills, North of Tirhoot.

a true *Helix* belonging to the *delibrata*-group.

foveola for *foveata*, Pfr.	Java.

Mr. Edgar Smith agrees with me, on a comparison of the species in the British Museum, that this is *rumphi*, Mus. Cuming.

saccata, Pfr.	Tavoy.

and this is only the young of *retrorsa*, Mus. Cum.

Dr. C. Semper (Reis. Arch. Philip. p. 50, 1870), on the character of the horn above the tail-gland and foot, places one sinistral species (*rumphi*, v. d. Busch.) and the following dextral shells in the sub-genus:—

martini, Pfr.	Sumatra.
nemorensis, Müll.	
javanica, Lamark	Java.
rareguttata, Mouss. (*Xesta*)	Adenare, near Timor.
striata, Gray (*Nanina*)	Singapur.
atrofusca, Albers.	Singapur.

It is very unlikely that these last six species from the islands of the Malay Archipelago have any very close relationship to the typical sinistral Bombay species *lævipes*, although the tail-gland does assimilate, and it would be better to keep them, as well as all the other species from the same region, separate for the present, as nothing is yet known of the anatomy of the Indian species. Only those purely Indian forms which I distinguish by antique type can be with certainty placed in this sub-genus.

Pfeiffer has also, besides typical forms and others (Zeits. 1855):—

ammonia, Valenciennes, (sp. in Brit. Mus.)	Habitat?
regalis, Bs., (I do not consider should be included.)	Borneo.
sannio, Pfr.	Habitat?
ampullarioides, Reeve (Mus. Taylor = *cysis*.)	Nilgiris.
linstedti, Pfr. (Mus. Cum.)	Malacca.

is closely allied to *rumphi*, but it is sharper keeled, and, if the latter should prove a true *Ariophanta*, it should also be included.

Des Moulins founded his genus on the animal of a specimen which had been sent to him alive from the island of Elephanta, Bombay, by M. Théophile Laterrade in March 1829. The mollusk lived some short time and two drawings of it were made. Previous to this the shell only had been described by Müller.

To M. Des Moulins, therefore, belongs all the credit of first noticing and distinguishing the very distinct and large group of Asiatic Helices possessing a mucous pore at the extremity of the foot, and for which group so characterized he proposed the title PHEREPORÆ, placing the Bombay shell in his sub-genus *Ariophanta*.

Dr. J. E. Gray four years afterwards, on the similar characters of another but very distinct species, created the genus *Nanina*, for Asiatic

Helices of this type, and his genus was adopted by Adams and others, although Thos. Hutton first, and Benson afterwards, had pointed out the distinction in the sub-genus *Macrochlamys;* I do not, therefore, see how in fairness and by all rules of nomenclature Mr. Gray's title can be adopted, as it has been, for the whole group (Indian and Malayan) of these Eastern Helices provided with a mucous pore which Des Moulins described so well and so accurately; the latter saw at once the important differences such an organ implied in the general anatomy of the animal and understood its great value in classification, and he shewed also its affinity in this respect to *Arion* by the title he gave it (*vide*, pp. 230, 235, where he gives in full the description of the animal, his remarks on which are well worthy of perusal).

H. (ARIOPHANTA) LÆVIPES, Müll., var. TRIFASCIATA, Chemn.

Pl. X, Fig. 3, 3*a*.

H. lævipes, Müller, Hist. Verm. 2, p. 22, no. 222.
„ ——— Gmelin, Syst. Nat. p. 3616, no. 13.
„ ——— Chemnitz, Conch. 9, t. 108, fig. 915, 916.
„ ——— sub-genus, *Hélicelle*, 2me group Aplostomes, 3me Sect. rubannées.
„ ——— Férussac, Hist. Moll. pl. xcii, fig. 3 à 6.
„ ——— Férussac, Tabl. Syst. p. 41, no. 229.

Sub-genus *Ariophanta*, Des Moulins, var. *a*. all white, without bands, from Island of Elephanta; var. *b*, *c*. banded, from the same locality (only this banded var. *trifasciata* figured in the Conch. Ind. pl. cxxxi, fig. 4.)

The figures are taken from No. 57*a* and 57*b* of the MSS. drawings representing specimens from Bombay.

ARIOPHANTA INTERRUPTA, Bs., Pl. X, Fig. 1, 1*a*.

Helix interrupta, Bs. Zool. Jour. Vol. V, p. 461, (1834), from Sikrigalli and on the Jellinghy river (tributary of the Ganges).
= *Himalayana*, Lea.

These figures have been reproduced from No. 44 in MSS. in Ind. Mus. Library; the specimens from which the original drawings were made were obtained in the Botanical Gardens, Calcutta.

Benson's description of this last in above Journal applies to *H. lævipes*, but in his description of the animal, he says the excrements are "voided from an opening in the terminal and posterior part of the foot instead of from the *foramen commune*" he must here evidently be mistaking the mucous gland for the anal orifice, although on the previous page (460), describing the genus Nanina, he shews that they are distinct openings.

H. —— Conch. Ind. Hanley, fig. 3, plate xxvii. Specimens from Faqirabunda, Jessore District, are thus described in my note-book—" The animal being of a pink colour the same tint is given to the shell, while black mottlings shew through the body whorl. The head is dark-coloured up to a well defined black line (extending from posterior part of the neck to below the oral tentacles), thence light-coloured with a pink tinge, which is more intense near the extremity of the foot. The mucous gland has the form of a long slit with a very small lobe above."

HELIX (ARIOPHANTA) LAIDLAYANA, Bs., Pl. X, Fig. 2.

Ann. Nat. Hist. Ser. 2, Vol. 18, (1856) p. 253.

The figure is a copy of fig. 30 of MSS. drawing of a specimen from Manbhum.

Helix laidlayana, Bs, Hanley, Conch. Ind. Pl. lviii, fig. 3, 4, 5: figure 4, from Cuttack would appear to be a different species from fig. 3, Orissa, which agrees with the original description, fig. 5.

H. (ARIOPHANTA) INTUMESCENS, W. T. Blf. Pl. X, Fig. 4.

J. A. S. B. 1866, p. 33, type from Mahableshwar, Western Ghats of Hindustan.

The figure is from fig. 17 of MSS. drawings and bears the following remark "*N. Canarica* from Fairbank" [Stoliczka].

Mr. Blanford writing of the animal and comparing it with *bajadera* says—"The animals also shew a difference in colour, that of *intumescens* is uniformly, so far as I have seen, dark cinerous, while that of *bajadera* is much lighter, but very variable. The latter shell is found mostly on shrubs, the former on the ground, and while *intumescens* has as yet only been found at Mahableshwar 4,500 feet above the sea, *bajadera* (which is rare at Mahableshwar) abounds on the equally or nearly equally high hills of Singhur and Poorundhur, and along the summit of the Western Ghats at about 2000 feet. It abounds at Khandalla at the top of the Bore Ghat."

Genus HEMIPLECTA, Albers.

Die Heliceen, p. 60, (1850).

Founded on the shell alone; type *humpfreysiana*, Lea, from Singapur.

"Testa supra granulosa vel decussatim striata; subtus polita, anfractus ultimus plus minusve angulatus vel carinatus."

Albers gives for the distribution of the species of this group the large islands of the Malay Archipelago, Java and the Philippines, New Ireland, &c.; only one species *labiata* (= *monticola*, Hutton) being from India, and that not agreeing with the description, the last whorl being well rounded. The two characters given would embrace a vast number of species having a much wider geographical range, and I should be inclined to restrict it to the Malay region and not to include any of the Indian forms, until other characters in common can be found after examination of the animals.

To Albers' list, Adams added, it is difficult to say why, several other species, among them *ligulata*, *semirugata*, and *tranquebarica*, shells widely differing in their very globose form from the generic description. Semper does not follow Albers, but places many of the species under

Rhysota, on the character of the odontophore; these I have marked with an asterisk.

Albers refers the following species to *Hemiplecta* :—

**bulla*, Pfr. (*Rhysota*, Albers)	Luzon.
fulvida, Pfr.	Mindanao.
biamensis, Mouss.	Java.
halata, Mouss.	Java.
rufa, Less.	New Ireland.
xanthotricha, Pfr.	Guimares Is. and Negros.
**setigera*, Sow.	Luzon.
**gummata*, Sow.	Luzon.
theodori, Phil.	Mergui.
bataviana, v. d. Busch.	Java.
centralis, Mouss.	Java.
cuvieriana, Lea	Luzon.
novæ-hiberniæ, Quoy.	New Ireland.
humphreysiana, Sea	Singapur.
—— *var. gemina*, v. d. Busch.	Java.
? *labiata*, Pfr.	Landour.
semigranosa, Sow.	Phillippines.
panayensis, Brod.	Panay, do.
**semiglobosa*, Pfr.	Samar, do.

Adams gives some others, three of which are Indian :—

blainvilliana, Lea.	
conoidalis, Adams and Reeve	Mindoro.
densa, Adams and Reeve	Philippines.
? *ligulata*, Férus.	Bengal.
limaënsis, Mouss.	
lurida, Gould	Feejee.
rubricata, Gould	Feejee.
rufescens, Gratel.	Madagascar ?
? *semirugata*, Beck.	Bengal.
steursii, Shuttl.	Amboina.
? *tranquebaricha*, Fabr.	India.
velutina, Sow. = *xanthotricha*, Pfr.	Philippines.

Theobald has included a large number of Indian species in this subgenus, with forms so varied he subdivided it into 5 sections; he does not give the characters, but notes the typical species in each (*vide* Suppl. Index, Conch. Indica).

Nevill in his Hand-List makes it much more circumscribed and admits

distincta, Pfr.	Saigon.
neptunus, Pfr.	Cambodia.

**cymatium*, Bs.	Penang.
sylvicola, W. Blf. MSS.	Naga Hills.
basileus, Bs.	Annamullys.
beddomei, Blf.	Travancore.
basilessa, Bs.	Annamullys.
? *undosa*, W. Blf.	Mandalay.
chenui, Pfr.	Ceylon.
†*oxytes*, Bs.	Khasi Hills.
†*cycloplax*, Bs.	Do.
? †*castor*, Theobald	Do.
? †*pollux*, Theobald	Do.
? †*blanfordi*, Theobald	Darjiling.
orobia, Bs.	Do.

Genus OXYTES, Pfeiffer.

Zeits. 1855, p. 188 [Without description.]

1. *Nanina oxytes*, Bs. (type.)

2. *thyreus*, Bs.

is a true *Ariophanta*.

3. *avus*, Pfr. ?

sinistral and it is difficult to understand on what grounds it is placed here.

4. *pallasiana*, Pfr. ?

This sub-genus would be the same as *Hemiplecta* (Sec. D) of Theobald (l. c. p. 22): who places therein :—

basilessa, Bs.	Travancore.

this should not be included. I do not recognize any resemblance even in form of the shell.

blanfordi, Theob.	Darjiling.
castor, Theob.	Khasi.
—— var. *a. cherraensis*, W. Blf.	Do.
cycloplax, Bs.	Darjiling.
oxytes, Bs.	Khasi.
pollux, Theob.	Khasi.

HEMIPLECTA OROBIA, Bs., Pl. XI, Figs. 1 and 1*a*.

No locality given.

HELIX (HEMIPLECTA ?) LIGULATA, Fér., Pl. XI, Fig. 3.

No locality given.

Vide Nevill's Hand-List (1878), p. 50, No. 284, as *Xesta ?* his notes on the animal are taken from this drawing. Madras ranging to Bhagulpur and Patna. (H. H. G.-A.)

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* Placed in *Rhysota* by Stoliczka, J. A. S. B. 1878, p. 11.

† Sub-genus *Oxytes*, Pfr. (see further on) forms a very recognizable group.

HELIX (OXYTES) OXYTES, Benson, Pl. XI, Fig. 2.

"No projection above the gland which is rather small; sole broadly margined, and with a double line," (W. T. B.) Nevill's Hand-List (1878) p. 47, No. 261.

I would call attention in this drawing to the close contiguity of the base of the eye-tentacles.

HELIX (OXYTES) POLLUX ?, Theobald, Pl. XI, Fig. 4.

"Cherra Poonjee from Godwin-Austen" [Stoliczka].

"Animal of a pale light yellowish ochre. Head rather darker, eye pedicels long and rather thick at the base. Extremity of foot and under part of it very pale, short, flat and rounded, the mucous gland has a very small lobe above it.

"I found this shell very abundant on the limestone in the forest below Nongkulang in the West Khasi Hills, and it ranges westward to the Garo Hills following the band of the Nummulitic rocks. The very peculiar thick shape and drooping form of the tentacles is to be noted in the drawing, their bases adjacent as in *H. oxytes.*" (H. H. G.-A.)

"A small lobe above the mucous pore; margins of mantle not produced over the edge of the shell, sole of foot narrowly margined." (W. T. B.) Nevill's Hand-List, p. 48, No. 264.

EXPLANATION OF THE PLATES.

Plate X.

Fig. 1, 1*a*. *Helix* (*Ariophanta*) *interrupta*, Bs.
Fig. 2. —— —— *laidlayana*, Bs.
Fig. 3. —— —— *lævipes*, Müller, var. *trifasciata*.
Fig. 4. —— —— *intumescens*, W. T. Blf.

Plate XI.

Fig. 1, 1*a*. *Hemiplecta orobia*, Benson.
Fig. 2. *Helix* (*Oxytes*) *oxytes*, Benson.
Fig. 8. *Helix* (*Hemiplecta ?*) *ligulata*, Fér.
Fig. 4. *Helix* (*Oxytes*) *pollux ?*, Theob.

XVI.—*New Species of Brackish-water Mollusks.*

By GEOFFREY NEVILL, C. M. Z. S.

(Received November 1st;—Read December 1880.)

Subfamily BYTHINIINÆ, Troschel [emend.].

Gebiss der Schnecken, I, 1857, as Group "Bythiniae"; emend. Stimpson, 1865, and Clessin, Malak. Blät. 1880, as subfamily of the Rissoidæ.

STENOTHYRA WOODMASONIANA, n. sp.

T. parva, imperforata, ovato-acuta, solida, crassa, pallide viridula, polita, nitida, (sub lente) obsolete submalleata; spira aculeiformis, subconcava, producta, apice peracutissimo; anfr. 6, haud convexi, ultimus pertumidus, medio subangulatus, basi applanatus, antice ad aperturam abrupte et valide deflectus; apertura percontracta, perfecte rotundata, marginibus continuis, valide incrassatis.

Long. 3⅕, diam. vix 2 mill.

HAB. Port Canning.

This interesting form is easily recognized by the very acute and concavely-excavated spire, the subangulate last whorl, flattened round the umbilical region; it is not spirally pitted, as in most species of the genus, but appears obsoletely malleated or indented under a powerful lens.

This is one of Mr. Wood-Mason's interesting discoveries from the still imperfectly explored brackish-water Sunderbunds (embouchure of the rivers Hooghly, &c.).

Type Indian Museum, Calcutta; also in coll. Dohrn, Beddome, Theobald, Blanford, and Hungerford.

STENOTHYRA HUNGERFORDIANA, n. sp.

T. parva, imperforata, ovato-elongata, solidiuscula, viridula, vix nitida, (sub lente) lineis impressis ac dense puncticulatis confertim cingulata; spira paululum elongata, ovato-convexa, apice obtuso, sutura profunda ac obsoleta marginata; anfr. 4, convexi, ultimus compresse oculiformis, antice subapplanatus, valde descendens; apertura perpusilla, suboblique rotundato-ovata, superne leviter angulata, sulco profundiori ab anfractu ventrali separata, peristomate obtuso.

Long. 2½, diam. 1¼ mill.

HAB. Andaman Islands.

This is one of the most distinct and interesting species of the genus as yet discovered: the few imperforate whorls, with markedly obtuse apex; the distinct, though minute, close punctulation; the unusually convex whorls, with the remarkable long, compressed, slightly flattened, and egg-shaped last whorl are all good characters. The suture is very distinct and, on the last whorl, distinctly marginate below. The operculum is normal.

Type Indian Museum, Calcutta; also in coll. Dohrn, Warneford, Theobald, Blanford, and Hungerford.

STENOTHYRA BLANFORDIANA, n. sp.

T. minima, superficie rimata, subventricoso-ovata, vix solidiuscula, nitida, laevis, pallide cornea, subpellucida; spira subacuta, apice minuto, subobtuso; anfr. $4\frac{1}{2}$, *convexi, ultimus magnus, subsolutus, tumide-ventricosus, subbiangulatus, antice subapplanatus; apertura subovalis, paululum postice retrorsa, peristomate continuo, superne angulato. Operculum ovale, superne leviter acuminatum, vix crassiusculum, subtranslucidum, spirale, apice subcentrali, interne testaceo-costatum.*

Long. $3\frac{1}{10}$, diam. $2\frac{1}{10}$ mill.

HAB. Chilka-lake (type); also Port Canning and Madras.

I am indebted to Mr. Wood-Mason for a careful examination of the operculum of this small form: "it is oval, subtransparent, spiral, of few whorls, with the apex almost central, on the inner side three ridges, one semicircular and two short ones with a slight S-curvature, for the attachment of the animal."

The species is somewhat variable, especially as regards size and the greater or less distinctness of the angulation of the last whorl. Specimens from Port Canning agree better with the above-described typical form than do those from Madras.

I have named this species in honour of its first discoverer, Mr. H. F. Blanford. It appears to be abundant at Port Canning, Chilka Lake, and Town of Madras; living with it there occurs another form, nearer *St. minima*, Sow. (but I think distinct), with more produced spire than *St. blanfordiana*, less tumid last whorl, without any trace of biangulation, with the aperture rounder, and not angled above; there is yet another still smaller decollate form from Port Canning, probably also a distinct species.

Type Indian Museum, Calcutta; also in coll. Hungerford, Theobald, Beddome, Blanford, and Dohrn.

Subfamily HYDROBIINÆ, *Troschel* [emend.].

Gebiss der Schnecken, I, 1857, as Group "Hydrobiae"; emend. Stimpson, 1865.

HYDROBIA (BELGRANDIA) MILIACEA, n. sp.

T. minuta, vix rimata, conico-elongatula, solida, parum nitida, albido-viridula, lævigata ; spira paululum producta, apice minuto, acutiusculo ; anfr. 5, *convexiusculi, ultimis duobus rapide accrescentibus, ultimo basi subplanulato, ad aperturam gibbositate crassa circumscripto ; apertura ovato-rotundata, intus incrassata, peristoma continuum, valide incrassatum, margine externo arcuato, basi sinuato, margine columellari subangulatim contorto, subreflexo. Operculum sat profunde immersum, tenue, pellucidum, vitreum.*

Long. vix 2¼, diam. 1¾ mill.

HAB. Port Canning.

Var. *minor* ; long. 2, diam. 1¼ mill.

HAB. Port Canning.

Found in great abundance in brackish-water ponds, associated with *Valvata* (?) *microscopica*, Nev., new species of *Bythinia*, *Martesia*, *Teredo* (?), *Pharella*, *Theora*, *Stenothyra blanfordiana*, &c. From the last-named, the remarkable callosity behind the outer lip, besides many other characters above recorded, at once distinguishes it.

This interesting shell is the first extra European species described of the genus (?) *Belgrandia*, Bourg.

Type Indian Museum, Calcutta ; also in coll. Beddome, Theobald, Hungerford, Joly, Dohrn, and Blanford.

Subfamily ASSIMINEINÆ, [emend.].

Group Lithoglyphi, Troschel, Gebiss der Schnecken, I, 1857 [pars].

Fam. Assiminidae, H. and A. Adams, Genera Moll. 1858.

Fam. Assimineidae, Clessin, 1880.

Section of sub-fam. Pomatiopsinae, Stoliczka, Gast. I, 1868.

ASSIMINEA SINENSIS, n. sp.

T. imperforata, ovato-conica, solidula, nitida, subglabra, castaneo-fusca, linea impressa infra suturam subobsolete notata ; spira producta, conica, apice subacuto ; anfr. 7½, *subplaniusculi, ultimus compressus, vix convexiusculus, carina nulla munitus ; apertura parva, subverticalis, marginibus callo subobsolete junctis, margine externo tenui, margine columellari arcuato, incrassato, saturate castaneo-fusco, inferne subangulato.*

Long. 5, diam. 3 mill.

HAB. Hongkong.

I am indebted for this, as for many other novelties, to Surgeon-Major R. Hungerford.

Type Indian Museum, Calcutta; also in coll. Hungerford.

ASSIMINEA PEASEANA, H. Nevill, MSS.

T. peranguste perforata, ovato-conica, notabiliter tenuis, glabra, nitida, vivide straminea, ad suturam fascia livida (plus minusve subobsolete) marginata; spira convexo-conica, producta, apice acuto; anfr. 7, *convexiusculi, ultimus rotundatus, inferne convexus, circa perforationem haud carinatus; peristoma perregulariter rotundatum, ad basim haud angulatum; margo columellaris late dilatatus, subduplex, castaneo vivide tinctus; apertura subrotundata, marginibus callo subobsolete castaneo junctis.*

Long. 5¾, diam. 3½ mil.

Hab. Lake Negombo, Ceylon.

Named in manuscript by my brother, in honour of the late Harper Pease of Honolulu; it is a very distinct species, easily distinguished from *Ass. subconica*, *Ass. marginata*, &c., by its thin texture, peculiar coloration, absence of any trace of sculpture, rounded margins of the aperture, &c. Specimens of rather larger size than that of which the measurements are above recorded occasionally occur.

Type Indian Museum, Calcutta; also in coll. H. Nevill and H. Dohrn.

ASSIMINEA BIFASCIATA, n. sp.

T. imperforata, ovato-conica, solida, vix glabriuscula, subnitida, sordide viridula, fasciis binis fuscis et subobsoletis cincta; spira moderate producta, convexo-conica, apice subacuto; anfr. 6½, *convexiusculi, ultimus tumide ventricosus, ad peripheriam subangulatus; apertura ampla, subverticalis, marginibus callo pervalido fusco-limbato junctis, margine columellari fere recto, valide incrassato, sordide fusco, inferne subrotundato.*

Long. 5½, diam. 3¼ mill.

Hab. Brackish-water lagoon, Port Natal.

A common species, quite distinct from the three forms described by Krauss.

Type Indian Museum, Calcutta.

ASSIMINEA DOHRNIANA, n. sp.

T. parva, solidiuscula, ovata, fusco-viridescens, anguste umbilicata, laevigata, sutura lineari, haud marginata; spira curta, apice perobtuso; anfr. 4, *rotundato-convexi ac tumidi, ultimus inflatus, subtus convexus, basi prope regionem umbilicalem subexcavate depressus; apertura subverticalis, ovato-pyriformis, dimidiam totius longitudinis aequans, intus pallide* *viridescens ; margo columellaris superne valide intortus, reflexus, inconspicue fulvo tinctus, inferne vix rotundatus.*

Long. 3, diam. 2⅓ mill.

Hab. Hongkong.

The short spire, with obtuse apex, the depression of the last whorl round the narrow umbilicus, the bent columella, and the thick somewhat eroded texture, of a greenish colour unusual in the genus, are the best characteristics of this small species, for which I am indebted to my friend Surgeon-Major R. Hungerford ; I have named it after my esteemed correspondent Dr. Henry Dohrn of Stettin.

Type Indian Museum, Calcutta ; also in coll. Dohrn and Hungerford.

ASSIMINEA WOODMASONIANA, n. sp.

T. imperforata (vel ad regionem umbilicalem mintissime perforata), carina parva ac subobsoleta circumscripta, lanceolata, conica, solidiuscula, nitida, subglabra, dilecte castanea, prope suturam pallide rubido fasciata ac linea impressa marginata ; spira conico-elongata, anfractum ultimum fere aequans, apiceperminuto, acutissimo ; anfr. 7½, vix convexiusculi, regulariter crescentes, ultimus subcompressus, obscure subangulatus ; apertura parva, subverticalis, ovata, marginibus callo tenui junctis, margine columellari pallide castaneo, paululum incrassato, subrecto, inferne subangulato.

Long. 4, diam. 2⅕ mill.

Hab. Port Canning, near Calcutta.

I have named this pretty and very distinct species after my friend Mr. J. Wood-Mason, to whose very successful researches in the Sunderbunds the Museum is indebted for so many interesting mollusks, as I have already pointed out in my Catalogue, Fasc. E. p. 22, when describing the operculum of *Larina burmana.* The small, almost obsolete, keel round the very minute perforation (which is sometimes completely covered) is very characteristic.

Mr. Wood-Mason has favoured me with the following extract from his note-book on the animal of this species—" Eyes large, intensely black, situated on the upper side and near the extremity of the peduncle ; animal transparent, above very slightly greyish, between the tentacles reddish, which are so transparent that the eye-spots can be seen very nearly as well from the under side."

Type Indian Museum, Calcutta ; also in coll. Beddome, Hungerford, Blanford, Dohrn, Theobald, and Joly.

ASSIMINEA BEDDOMEANA, n. sp.

T. depresso-turbinata, quoad formam species generis Colloniæ *quodammodo memorans, peculiariter obscure sed profunde umbilicata, de-*

presso-conoidea, solida, crassiuscula, nitida, subglabra, ad basim (sub lente) striis incrementi subobsoletis munita, saturatissime fulvo-livida, infra suturam albo fasciata, fascia prope aperturam plus minusve evanescente; sutura vix distincta, linea obscure impressa et subobsoleta notata; spira obtuse depresso-conoidea, apice minutissimo; anfr. 5, *ultimus subtus perglobose ventricosus, ad peripheriam obsolete subsubangulatus, infra subplanulatus, circa umbilicum callo lato pallide fusco et obscure albo-limbato munitus; apertura ampla, subrotundata, intus incrassata, marginibus callo albido prope aperturam valido ac distincto (interdum subobsoleto) junctis; columella pernotabiliter et valide incrassata, inferne abrupte retrorsa, triangulari-linguiformis, applanata ac excavate rugosa, superne in umbilicum abrupte desinens. Operculum tenue ac corneum; anfr.* 3 *(sub lente vix distinguendi) in umbonem subcentralem ac prominentem desinentes.*

Alt. 3, diam. 3⅙ mill.

HAB. Port Canning.

The most remarkable and abnormal species of the genus as yet described. The animal is that of a typical *Assiminea*, both the late Dr. Stoliczka and myself having examined numerous specimens. The Museum is indebted for its extensive series of this and the following species to Mr. Wood-Mason.

Type Indian Museum, Calcutta; also in coll. Dohrn, Hungerford, Blanford, Theobald, Joly, and Beddome.

ASSIMINEA THEOBALDIANA, n. sp.

T. parva, anguste umbilicata, ovato-conica, solidiuscula, vix nitida, corneo-fulvida, sub lente spiraliter minutissime confertimque sulcata, striis incrementi plus minusve obsolete decussata; spira conica, vix producta, apice acuto; anfr. 6½, *convexi, supremi sublaeves, caeteri infra suturam distincte angulati, superne sublaeves, inferne spiraliter confertimque sulcati, oblique subgranulatim decussati, ultimus globose subrotundatus, in medio striis decussantibus plus minusve subobsoletis, prope umbilicum distinctioribus, notatus; apertura sat ampla, subverticalis, marginibus callo nitido junctis, margine columellari supra leviter contorto, infra rotundato.*

Long. 4⅓, diam. 3 mill.

HAB. Port Canning.

In old specimens, the last two or three whorls have a pitted appearance, as in many species of *Stenothyra*; in younger ones, the two antepenultimate whorls have a beautiful granulose appearance under the lens. The oblique and decussating striae are always obsolete on the last whorl, except near the umbilicus and in the interstices of the spiral sulcations; the narrow smooth ledge below the suture, on the last two or three whorls, formed by an abrupt cessation of the sculpture, is very peculiar and characteristic. I need scarcely say that I have named this remarkable species after my friend Mr. William Theobald of the Geological Survey of India.

Type Indian Museum, Calcutta; also in coll. Theobald, Hungerford, Beddome, Blanford, Dohrn, and Joly.

ASSIMINEA MICROSCULPTA, n. sp.

T. parva, vix perforata, cylindrico-conica, solidiuscula, vix nitida, fulvo-cinerea, spiraliter distincte sulcata, striis longitudinalibus obliquis ac flexuosis decussata, apice acuto; anfr. 5½, *gradato-cylindrici, supremi laeves,* 2*dus spiraliter sulcatus,* 3*tuis et* 4*tus insigne equaliterque decussati (quasi gemmulati), ultimus subbiangulatus, supra peripheriam angulatus, striis decussantibus paululum subobsoletis notatus, sculptura infra evanescente; apertura subverticalis, parva, marginibus callo indistincto junctis, margine columellari haud contorto, leviter rotundato.*

Long. 2¾, diam. 1¼ mill.

HAB. Port Canning.

Type Indian Museum, Calcutta; also in coll. Dohrn, Joly, Hungerford, Theobald, Blanford, and Beddome.

It presents some resemblance to the preceding species in the sculpture, which in *Ass. microsculpta*, however, is much more strongly developed, the difference in young specimens being especially marked. The shape is quite different, the whorls being cylindrically-gradated, instead of convexly-swollen, &c.

ASSIMINEA HUNGERFORDIANA, n. sp.

T. imperforata, ovato-conica, solida, nitida, glabra, polita, omnino laete castanea, sutura subindistincta; spira brevis, apice vix acuto; anfr. 6, *subtumide convexiusculi, ultimus magnus, regulariter ovuliformis, infra suturam linea impressa subobsolete notatus; apertura verticalis, marginibus callo castaneo junctis, margine externo tenui, margine columellari incrassato, recto, paululum retrorso, ad basim subabrupte angulato.*

Long. 4, diam. 2½ mill.

HAB. Mouth of the Rangoon River.

I have much pleasure in naming this beautiful and very distinct species after its discoverer, Surgeon-Major R. Hungerford, who has lately been most successful in collecting and dredging Mollusca both at Hongkong and the Philippine Islands. The rich chocolate, or chesnut, colour of the species is very characteristic; there is a slight tendency on the upper portions of the whorls to be of a darker and duller shade; the indistinct suture, short but produced spire, large and regularly egg-shaped last whorl, straight and slightly twisted columella, forming an angle at its base, are all well-marked characters. Under a very powerful lens, striæ of growth are discernible, which become more developed behind the outer lip.

Type Indian Museum, Calcutta; also in coll. Hungerford.

ASSIMINEA TEMPLEANA, n. sp.

T. imperforata, ovato-conica, persolida, crassa, nitida, laevis, fusco-cornea, sutura distincta, haud marginata; spira conica breviter producta, apice acuto; anfr. 5½, convexiusculi, rapide crescentes, ultimus magnus, tumide ventricosus, ad peripheriam subangulatus, basi subapplanatus; apertura sat magna, marginibus callo acuto valido et albo junctis, margine externo regulariter convexo-rotundato, columellari subrotundato, duplice ac valide reflexo, regionem umbilicalem tegente, supra distincte transversimque unisulcato.

Long. 3¾, diam. 2½ mill.

HAB. Nicobar Islands.

I have named this interesting small species after Lieutenant R. C. Temple, who has presented the Museum with many valuable shells from the Andamans, Ferozepore, and other places. It is eminently characterized by the remarkable callously-reflected, duplex columella, transversely notched or sulcated above.

XVII.—*On some Experiments instituted to supply* all *the Lines terminating at the Calcutta Telegraph Office with Currents tapped from the Main-Current produced by a Dynamo-electric Machine.*[*]

—*By* LOUIS SCHWENDLER, M. Inst. C. E.

Introduction.—On the 5th November 1879, I had the honour to read a short paper before this Society entitled,[†] "On a simple Method of using an insignificant Fraction of the Main-Current produced by a Dynamo-Electric Machine for Telegraphic Purposes."

In the present paper, I wish to record some more experiments on the same subject. As stated in my former paper, the dynamo-electric machine, during this first experiment, was placed at the store-yard, and was driven by the steam engine of that place. The telegraph current was conveyed to the Calcutta Telegraph Office by the store-yard line, which is about 4 miles in length. This first trial proved so successful that I ventured to propose a larger trial to supply *all* the lines entering the Calcutta Telegraph Office with signalling currents derived in this manner. But I could not then execute the new trial, as in the first place there were no proper driving arrangements at the store-yard (the erection of these would have cost money), and in the second place the dynamo-electric machine at my disposal had, by an accident, been temporarily spoiled. It was thought advisable, therefore, to postpone the suggested trial on a larger scale until the electric light arrangements at Howrah[‡] should be completed, when an easy opportunity would offer itself for trying different dynamo-electric machines for the purpose. Besides, telegraph lines being already up between the Howrah Railway Station and the Calcutta Telegraph Office, no additional expense would need to be incurred.

New trial on a larger scale.—The preliminary trial was instituted on the 28th August, the final one on Sunday the 29th August 1880.

In the accompanying diagram, *M* is the dynamo-electric machine which produces the main current to be made use of for any required purpose; the negative pole of the dynamo-electric machine is connected permanently to earth. The earth consists of 3 copper plates[*] joined parallel and offering a parallel resistance of 1·67 ohms.[†]

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[*] The results given in this paper are taken from my report submitted to the Director General of Telegraphs in India on the 7th September 1880.

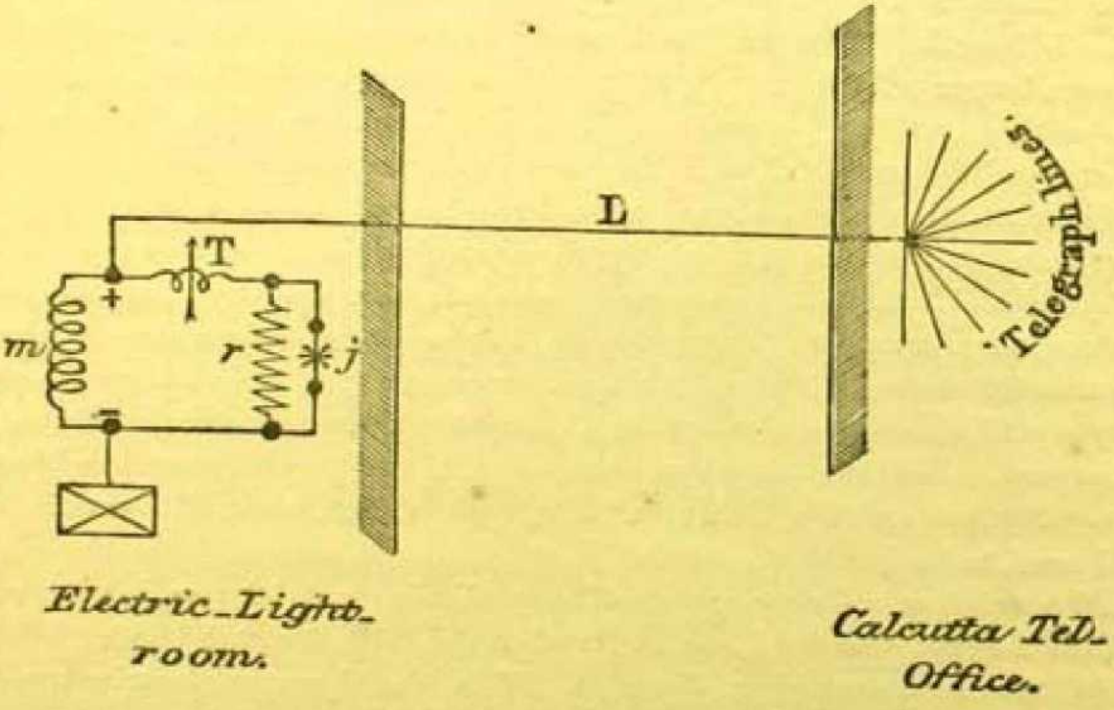
[†] J. A. S. B., Vol. xlix, part ii, 1880, and Phil. Mag. No. 52. Suppl., December 1879.

[‡] Mr. Bradford Leslie, Agent of the East Indian Railway Company, gave me permission to use the electric light arrangements at Howrah for the purpose. He also kindly permitted the use of the telegraph line connecting his office at Calcutta with the Railway Station at Howrah. This line was required to give orders during the experiment.

T is a tangent galvanometer for measuring the main current. In this case it was the tangent galvanometer employed in my electric light experiments in London in 1878. The resistance of the copper ring of this instrument is *nil*. Taking the late Mr. Brough's value for H, the horizontal component of the Earth's magnetic intensity at Calcutta to be $H = 0·37158$ dynes, the formula for calculating the currents c from the deflections observed by this tangent galvanometer, is :—

$$c = 47330 \text{ tang } \alpha \text{ (milli-oersted).}$$

r is a coil of iron wire (No. 24 i. w. g., 0·21″ diameter) offering a resistance of 1·517 ohms at 85° F. The wire is coiled on a large wooden drum and serves as the constant resistance by which from time to time the efficiency of the dynamo-electric machines at Howrah can be gauged.



J represents an electric light, in this case produced by a large Serrin-lamp.

In the following experiments, either *r* or *J* was used as the external resistance for closing the poles of the dynamo-electric machine to produce the *main* current ; but *never* the *two* joined parallel.

L is the telegraph line from the dynamo-electric machine to the Calcutta Telegraph Office. This line is 1·75 miles in length and consists, from the electric light room to the Howrah Railway Station, of Hooper's india-rubber cable core, from the Howrah Station to the Kirk, of No. 6

[*] The three single earths measured gave : 7·7, 3·1, and 6·9 B. A. U.

[†] The dimensions are 4′ × 2′ and $\frac{1}{16}$″.

i. w. g., and thence to the Calcutta Telegraph Office it is American compound wire of the same resistance as iron wire of No. 27 i. w. g.

At the Calcutta Telegraph Office, the *battery wire*[*] could at a moment's notice be connected with the key of each instrument, after throwing off the copper of the signalling battery in ordinary use. The telegraph lines terminating at the Calcutta Office were therefore all connected *parallel* to the battery wire, as is indicated in the foregoing diagram.

In order to enable me to directly compare the signalling current sent into the lines by batteries and by a dynamo-electric machine, each line is as tested for *sent current* at Calcutta, and for *received current* at the out-station.

Preliminary trial on 28th August 1880.—The line used for tapping the signalling current was No. 5, Calcutta to Allahabad, 577 miles in length, worked *direct* and having a real conduction resistance of about 3075 ohms. (taken from the August 1880 tests). The resistance of the relay at Allahabad equals 492 ohms.

1st Experiment.—This consisted in taking the *sent current* at *Calcutta* and *the received current at Allahabad* as produced by a battery of 60 minotti-cells connected up in series. This is the usual signalling battery during the monsoon.

2nd Experiment.—The main current in this experiment was produced by dynamo-electric machine A[†] through the resistance r. The resistance in circuit was not measured, but may be taken to be as follows:—

$$\left.\begin{array}{lr} & m = 0{\cdot}652 \\ & r = 1{\cdot}517 \\ \text{Leading wire to tangent galv.} & l = 0{\cdot}026 \end{array}\right\} \text{ohms at } 85^\circ \text{ F.} \qquad \begin{array}{l} \text{internal.} \\ \left.\begin{array}{l} \\ \end{array}\right\} = 1{\cdot}543 \text{ external.} \end{array}$$

Total, 2·195 ohms.

The main current gave a mean deflection of 37·9°; $\frac{\text{max.}}{\text{min.}} = \frac{39}{36{\cdot}2}$; mean speed of engine 60·3 revolutions per minute; $\frac{\text{max.}}{\text{min.}} = \frac{62}{58{\cdot}5}$. The variation of the current corresponds with the variation of the speed.

3rd Experiment.—The main current in this experiment was produced by dynamo-electric machine E.[‡] through the resistance r. This experiment was made in order to see whether A or E machine would suit the circumstances best.

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[*] The Telegraph line conveying the current produced by the dynamo-electric machine to the Telegraph Office may be called most appropriately the *battery wire.*

[†] This is a Siemens' dynamo-electric machine called *medium size* (see my *précis* of report on the electric light experiments in London).

[‡] This is a Siemens' medium machine altered according to my specification (See *précis* of report on the electric light experiments in London).

The resistance in circuit was not measured, but may be taken to be the same as given for A. The main current gave a mean deflection of $30{\cdot}6^\circ$; $\frac{\text{max.}}{\text{min.}} = \frac{33{\cdot}7}{27{\cdot}0}$; mean speed of engine = $59{\cdot}9$ revolutions per minute; $\frac{\text{max.}}{\text{min.}} = \frac{66}{54}$. The variation of the current corresponds with that of the speed.

The results of the preliminary trial are given in the following table :—

No. of Experiment.	Mode of producing the current.	Speed of engine per minute.		Mean speed per minute of dynamo-electric machine.	Mean of main current in milli-oersteds.	Current in milli-oersteds.	
		Mean.	$\frac{\text{Max.}}{\text{Min.}}$			Sent at Calcutta.	Received at Allahabad
1	60 Minotti	...	...	...	9·8	9·8	5·1
2	Dyn. el. machine A.	$60{\cdot}3^{7}$[*]	$\frac{62^{1}}{58{\cdot}5^{1}}$	783	36,846	14·5	7·7
3	Dyn. el. machine E.	$59{\cdot}9^{6}$	$\frac{66^{1}}{54^{1}}$	641	27,991	9·4	6·6

The three experiments were made in the order given. Nos. 2 and 3 were made from 11 to 11·44 hours, during which time messages were sent. The insulation of the battery wire L was variable from 71,000 to 95,000 ohms absolute.

From Experiments 2 and 3, it will be seen that A machine produces a larger main current than E, which is due to the higher speed of A; further, that the *sent current* tapped from the main current of A is larger than the *sent current* tapped from that of E, just as it ought to be. In fact, if the line during the two experiments had kept constant, and if also r had kept constant (r increases considerably by heating), the proportion of the two *main currents* would have been the same as that of the two sent currents, and this is very nearly the case.[†] No. 3 Experiment with E machine gives about the same result as No. 1 Experiment with battery. To produce the main current by A is therefore more advantageous than to produce it by E. Hence I employed A in the final trial.

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[*] The small numbers in the form of exponents mean the number of observations made.

[†] $\frac{A}{E}$ main currents = $1{\cdot}32$.

$\frac{A}{E}$ sent currents = $1{\cdot}55$.

The final trial on Sunday 29th August 1880.—The battery wire, before the trial began, was tested for insulation, and gave an absolute insulation greater than 1 Ω ohm. The main current, as already mentioned, was produced by dynamo-electric machine A; *i. e.*, from 8·45 to 11·5 hours through the wire coil of resistance r, and from 11·5 to 11·32 hours through the arc of an electric lamp producing the light J. The light of the lamp was not measured, but may have been equal to about 6,000 standard candles.* The first line was connected to the battery wire at 8·45 hours; the last line at 10·53 hours. The whole trial was completed at 11·32 hours.

The change from r to lamp (J) was made in so short a time that none of the out-stations noticed it. Messages were sent and received in the usual regular style.

Mr. C. B. P. Gordon, the Superintendent of the Bengal Division, attended at the Signal Office.

At the beginning of the experiments, the resistances in circuit were measured.

$$\left.\begin{array}{l}\left.\begin{array}{l}\text{Internal resistance of dynamo-electric}\\ \qquad\text{machine A}\end{array}\right\}m = 0{\cdot}652 \text{ internal}\\[1ex] \left.\begin{array}{ll}\text{Wire coil} & r = 1{\cdot}517\\ \left.\begin{array}{l}\text{Leading wire to tangent}\\ \qquad\text{galvanometer}\end{array}\right\} & l = 0{\cdot}026\end{array}\right\}1{\cdot}543 \text{ external}\end{array}\right\}\text{ohms at } 85^{\circ}\text{ F.}$$

After the experiments were over, these resistances were not measured again; however, on account of the very considerable heating by the strong main current, they must, we know, *all* have increased considerably.

When r closed the poles of the dynamo-electric machine (8·45 to 11·5 hours) the mean speed of the engine was 60^{13} revolutions per minute; $\frac{\text{max.}}{\text{min.}} = \frac{64'}{56'}$; while the mean deflection of the main-current was $37{\cdot}87^{68}$; $\frac{\text{max.}}{\text{min.}} = \frac{40{\cdot}25^{1}}{35{\cdot}0^{1}}$.

When the lamp was in circuit (from 11·5 to 11·32 hours), the mean speed of the engine was again 60^{13}; $\frac{\text{max.}}{\text{min.}} = \frac{61}{59}$; while the mean deflection of the main-current was 44^{17}, $\frac{\text{max.}}{\text{min.}} = \frac{46^{2}}{42^{1}}$.

In the following table all the results are given:—

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* When measured under 45° with the horizon.

Table shewing the Sent and Received Currents and other particulars.

1	2	3	4	5	6	7	8
No. of Experiment.	Number and name of line and length in miles.	Real conduction resistance of line in b. a. u.	Resistance of Relay at receiving station in b. a. u.	Currents in milli-oersteds.		Mode of producing the currents.	Remarks.
				Sent at Calcutta.	Received at out-station.		
I	No. 1 Jubbulpore 738	4,412	905	6·18 9·81 5·89	4·00 7·60 4·45	100 cells Dyn.-el. m. A 100 cells	The several lines were connected to the battery wire in the order given in this table. The first line, Jubbulpore No. 1, was connected at 8·45 hours; the last line No. 3, Agra, at 10·53 hours. Before the actual experiments began, *i. e.*, before 8·45 hours, all the lines were tested for *sent currents* at Calcutta, and *received currents* at the outstations, when the usual signalling battery was on. Directly after each line had been connected to the battery wire of the dynamo-electric machine, the *sent currents* at Calcutta and the *received currents* at outstations were taken.
II	No. 4 Jubbulpore 803	5,795	406	7·07 10·23 7·41	3·60 4·71 3·50	60 cells Dyn.-el. m. A 60 cells	
III	No. 5 Allahabad 577	3,075	492	9·81 13·79 9·41	6.50 8·57 5·08	60 cells Dyn.-el. m. A 60 cells	
IV	No. 6 Sahibgunge 225	2,000	506	7·14 21·65 6·63	4·09 11·40 4·23	20 cells Dyn.-el. m. A 20 cells	
V	No. 7 Cuttack 400	2,800	953	6·63 11·00 6·63	3·00 6·00 3·38	35 cells Dyn.-el. m. A 35 cells	
VI	No. 8 Coconada 800	7,000	3,711	4·00 8·15 4·00	3·60 7·20 2·01	119 cells Dyn.-el. m. A 119 cells	
VII	No. 9 Akyab 560	3,460	3,470	7·69 6·77 6·18	4·00 3·90 5·35	120 cells Dyn.-el. m. A 120 cells	
VIII	No. 11 Dhubri	...	1,427	6·40 11·78 6·42	5·00 11·45 5·73	40 cells Dyn.-el. m. A 40 cells	
IX	No. 10 Akyab 561	4,400	...	15·39 15·39 17·43	3·10 3 90 3·30	80 cells Dyn.-el. m. A 80 cells	
X	No. 2 Agra 915	6,700	829	15·39 7·14 14·52	6·40 3·90 6·15	195 cells Dyn.-el. m. A 195 cells	
XI	No. 3 Agra 850	5,800	1,959	13·54 13·38 9·41	3·25 3·10 4 14	100 cells Dyn.-el. m. A 100 cells.	

After the dynamo-current was stopped at 11·32 hours, and the batteries had been connected up again, the *sent currents* at Calcutta and the *received currents* at outstations were again ascertained. Hence columns 5 and 6 contain 3 readings of *sent* and *received currents* for each line; first, with battery, secondly, with the dynamo-electric machine, and, thirdly, with the battery again. All the readings of the currents tapped from the main current of the dynamo-electric machine were taken between 8·45 and 10·53 hours, when the iron wire coil of resistance r was connected to the poles of the dynamo-electric machine. From 11·5 to 11·32 hours, when the lamp was substituted for r, no current readings at Calcutta and the outstations were taken.

The main current of the dynamo-electric machine, when r was in circuit, was 36,801 m. ö; when the lamp was in circuit, 45,706 m. ö.* From this it does not follow, however, that the tapped currents in the second case were larger than in the first, because it would also depend on the resistance offered by the arc, which is not known. The resistance of the arc, as more current was produced with the same speed of the dynamo-electric machine, must naturally have been smaller than $r = 1·517$ b. a. u. (iron wire coil), especially as there is an e. m. f. in the arc opposite to the e. m. f. of the dynamo-electric machine.

To produce 36,801 milli-oersteds through an external resistance of about 1·543 b. a. u., a total energy is consumed by the dynamo-electric machine of about 27,000 Ω ergs per second (representing about 3 h. p. per second).

Conclusions.—These experiments shew that it is perfectly possible and practicable to tap from the main current produced by a dynamo-electric machine *all* the signalling currents required at the Calcutta Telegraph Office. These currents were for the 11 lines connected up = 129·1 m. ö, if all keys were simultaneously and permanently sending. This represents only 0·35 $^{\circ}/_{\circ}$ of the main current (36,801 m. ö) with r in circuit, and ·28 $^{\circ}/_{\circ}$ of the main current (45,706 m. ö) with lamp in circuit. Further it will be clear that such a small variation of the main-current could not influence the regularity of any work done by that main-current.

Further, it will be seen that in all the experiments the sent currents tapped from the main current of the dynamo-electric machine were considerably larger than when produced by the large batteries at present in use. Experiments IX and X only form an exception. However, I think these exceptions are in both cases due to errors of observation, because the battery readings in Experiment IX do not all agree. The dynamo-current readings in No. X must be wrong, because in No. XI, for a total circuit resistance of 7759 units, the sent current is 13·38 m. ö,

* Calcutta by the formula: $e = 47330$ to (m. 0″).

while in No. X, for a total circuit resistance of 65·29, the sent current is only 7·14. The error of observation is therefore obvious.

That with such strong received currents as are produced when the dynamo-electric machine is used, the lines should work well, is not to be wondered at. But it was also confirmed by the outstations having to adjust their relays much more unsensitively.

Supposing now that we had useful work *day* and *night* for the strong main current, and that on the whole the new method could be always depended upon, I believe these experiments have proved that the signalling currents required in telegraph stations could be had for *nothing*, and that the method would be quite practicable.

The useful work for the main current at night would most conveniently take the shape of an electric light to illuminate very efficiently the Signal Office. The electric light, besides being more powerful, would possess the additional advantage of being produced by at least 50 times less heat than if the same light were obtained by combustion. This is no doubt a great advantage in a hot climate. During the daytime, I would use the main current for pulling punkhas, lifting messages, or, more generally, for working a pneumatic system of sending and receiving messages, &c., &c. If Calcutta had the good fortune to possess a colder climate, it might be suggested that the heat developed in the coil of wire should be used for warming rooms. It would then only be necessary to lead the wire along the walls, in a manner similar to that in which hot water pipes often are for heating rooms; the electric method being only far more economical. The heat given up by the wire, after dynamic equilibrium of the system has been established, is quite regular, and the method is obviously exceedingly clean and very convenient for domestic purposes. The wire attained its constant temperature of 93° C. after the current had acted for about half an hour, the air of the room having a temperature of 30° C.

The heat given out by the wire is by no means small. For instance, in our case, the average current working through a resistance $r = 1{\cdot}543$ b. a. u. was 36801 milli-oersteds. This represents work done at a rate of 20473 Ω ergs per second, and supposing the wire has obtained its constant temperature, this whole energy is developed into heat emitted by the wire into space at a rate of $\frac{20473}{42} = 488$ gramme-degree-centigrade per second. This is equal to the heat produced by an ordinary German stove consuming 6lbs of coals per hour; supposing that the loss of heat when coals are burnt under a steam-boiler is four times as great as when they are burnt in a German stove. It appears, therefore, that the heat developed by the wire would be sufficient to keep a moderately sized and ordinarily ventilated room at a comfortable temperature even when situated in the highest latitudes.

XVIII.—*On the Lepidopterous Genus* Æmona, *with the Description of a new Species.—By* J. Wood-Mason.

(With Part of Plate VI).

Several years ago, three plain pale-fulvous butterflies of moderate size were forwarded to the Indian Museum by Mr. S. E. Peal of Sibsagar, Assam. All three are of the male sex, and they agree so remarkably closely in size and colour as to have been taken for specimens of one and the same species. On examination, however, I find that, though superficially so similar to one another, they differ in structure and represent two distinct but closely-allied species, one of them being a male (hitherto undescribed) of *Æmona Amathusia*, and the other two, males of an undescribed form belonging to the same genus. For the benefit of naturalists in India to whom the costly works in which they occur are inaccessible, I have extracted the original descriptions of the two described species.

The genus *Æmona* was established by W. C. Hewitson in 1868 for the reception of an insect from Northern India which he had previously described under the name of *Clerome Amathusia*. Hewitson appears to have had some misgivings as to the propriety of this step, but, as will be seen from the following amended diagnosis, the genus is at least as distinct from *Clerome* as this is from *Thaumantis*, or as *Zeuxidia* from *Amathusia*.

Genus Æmona, Hewitson.

Head small. *Antennæ* rather short. *Anterior wing* acutely pointed and produced, or sharply angulated, at the apex; its inner margin straight in both sexes, not being lobed at the base in the male as it is in *Clerome* and less distinctly in *Thaumantis;* the costal vein reaching to the end of the fifth seventh of the length of the anterior margin; the subcostal 4-branched, the first branch given off just before the end of the cell, and, after running free for nearly the same distance beyond that point as it originates before it, completely coalescing with the costal, but again becoming free just before this last-named vein turns off to the anterior margin, the three remaining branches free. *Posterior wing* more elongated than, and not quite so rounded as, in *Clerome;* without the pencil of erectile setæ which, in the males of *Clerome* and *Thaumantis*, arises from the wing-membrane of the discoidal cell close to the subcostal vein and lies obliquely across a patch of elevated and crowded scales on the other side of this vein, the male scent-fans, if such are really present in this genus, being situated in a different part of the wing, *viz.*, in the anal region, where a line of setæ running along the anterior side of the submedian vein ends in a curled whisp which, when at rest, lies in a slight groove or fold of the wing-membrane.

Plain and delicate butterflies of a pale fulvous colour inconspicuously or obsoletely ocellated on the underside.

In the form of the hind-wings and in the position of the male scent-fans *Æmona* agrees with *Xanthotænia*, and in its pointed fore-wings with *Zeuxidia*, *Enispe*, and *Discophora*, but it differs from these and from all the other Indian genera of *Morphinæ* in the relations of the costal and subcostal veins to one another, and in other respects.

(*a.*) *Fore-wing produced and pointed at apex with its outer margin concave-sinuous.*

1. ÆMONA AMATHUSIA. Pl. VI, Figs. 3, 4, ♂.

Clerome Amathusia, Hewitson, Trans. Entom. Soc. Lond. ser. 3, vol. iv, 1867, p. 566, ♀.

Æmona Amathusia, Id., Exot. Butt. vol. iv, 1868, *Zeux.* et *Æm.* pl. i, fig. 3—4, ♀.

♀. "UPPERSIDE rufous-brown, the bands of the underside seen through. *Anterior wing* crossed beyond the middle by a band of orange-yellow: the apex dark brown. *Posterior wing* with some arcuate spots near the apex.

"UNDERSIDE rufous, tinted with darker colour. *Both wings* crossed at the middle by a common rufous-brown band: both with a band of minute rufous ocelli some of which are pupilled with white: both with a submarginal band rufous. *Anterior wing* with a pale rufous band near the base and a spot of the same colour at the end of the cell. *Posterior wing* with a dark rufous band near the base.

"Expanse $3\frac{2}{10}$ inches

"HAB. Northern India."

The female is only known to me from Hewitson's description and figures.

♂. Lighter-coloured than the female. UPPERSIDE pale fulvous, the strigæ or bands of the underside showing through. *Anterior wing* darker at the base and at the tip, between which darker parts the colour is very pale yellowish-fulvous. *Posterior wing* of the same shade as the base of the anterior one to within a short distance of the margin, whence it is paler, and with an indistinct submarginal series of arcuate marks extending from the apical to the anal angle. UNDERSIDE uniform pale fulvous; the strigæ as in the female; the ocelli (one, the second and largest, perfect, the remaining five rudimentary) of the posterior wing also as in the female, but in the anterior wing only the one between the first and second median veinlet and faint traces of that between the first median veinlet and the submedian vein are present; the thin submarginal brown line more obviously engrailed than in the female.

Length of anterior wing 1·4; whence expanse = 2·9 inches.

HAB. Naga Hills *(S. E. Peal)*. A single specimen.

2. ÆMONA LENA.

Æ. lena, Atkinson, Proc. Zool. Soc. Lond. 1871, p. 215, pl. xii, fig. 1, ♂.

♂. "UPPERSIDE. *Fore wing* pale brownish grey, crossed by a dark brown band, interrupted by the nervures from before the apex to near the posterior margin at two-thirds of its length from the base, beyond the band darker, with a slightly marked and incomplete submarginal line, before which is a series of five pale lanceolate blotches between the nervures directed towards the outer margin. All the nervures tinged with yellow and more or less dark-bordered. *Hind wing:* anterior portion from base to outer margin pale, posterior portion bright yellow, crossed by a submarginal series of three dark-bordered white blotches, and a fourth fainter blotch between the nervures, forming a short interrupted band from near the apex to the second median nervure. The submedian nervure fringed from its origin to near its extremity with long yellowish hairs, longest and most conspicuous towards its extremity.

"UNDERSIDE. *Both wings* crossed by a dark ferruginous band with sharply defined outer edge from the costa of the fore-wing near the apex to near the extremity of the submedian nervure of the hind-wing, and having a faintly traced submarginal line, before which is a series of blind white-centred ocelli. The cell of the fore-wing crossed near its middle by a curved ferruginous band. *Hind-wing* crossed by a ferruginous band near the base.

"*Antennæ* ferruginous; *palpi* and *legs* tawny yellow.

"Expanse of wings 3¼ inches.

"HAB. Yunan." Moolai, Upper Tennasserim 3,000—6,000 ft. *(Moore)*.

Atkinson does not give the sex of the specimen described and figured by him, but, as the two specimens in the Indian Museum obtained at the same time are males and agree perfectly in size and markings with his figure, he may be presumed to have described a male. In a specimen of the male recently received from the upper Thoungyeen forests, British Burmah, by Captain G. F. L. Marshall, the three white spots on the anterior half of the hind-wing are larger, forming a band divided by the veins.

(β.) *Fore-wing sharply angulated at the apex with its outer margin arched.*

3. ÆMONA PEALII. Pl. VI, Figs. 5, 6, ♂.

Æ. Pealii, Wood-Mason, Proc. Asiatic Soc. Bengal, July 1880, p. 123.

♂. Closely allied to *Æm. Amathusia.* UPPERSIDE coloured and marked in the same manner, but with the ocelli as well as the strigæ of the underside showing through. *Anterior wing* with the apex angulated but not produced, the outer margin arched instead of concave-sinuous, and the inner angle not so broadly rounded. *Posterior wing* darker-coloured and also paling towards the outer margin, but with the submarginal series of arcuate marks smaller and less distinct. UNDERSIDE coloured and marked in much the same manner, but with more perfectly formed and more numerous ocelli; the anterior wing having three (the first between the submedian vein and the first median veinlet, the second the largest and best defined) perfect ocelli and two or three rudimentary ones following them, and the posterior wing, one rudimentary (close to the submedian vein) and six (the first in the same interspace with the rudimentary one, and the second the largest of all) perfect ones; each ocellus dark brown encircled by a very fine line of the colour of the strigæ and pupilled with iridescent silvery-white; the thin submarginal brown line rather more deeply engrailed.

Length of anterior wing 1·35; whence expanse = 2·8 inches.

HAB. Sibsagar, Assam *(S. E. Peal)*. Two specimens.

* * *

XIX.—*Description of a new* Papilio *from the Andaman Islands.*—

By J. WOOD-MASON.

(With Part of Plate VI.)

PAPILIO LÆSTRYGONUM. Pl. VI. Figs. 1, 2, ♂.

P. Laestrygonum, Wood-Mason, Proc. Asiat. Soc. Bengal, June, 1880, p. 102.

♂. Wings above cretaceous-white, the anterior ones black at the insertion, scarcely tinged with greenish at the base, with five black bands commencing at the anterior margin and cutting the cell, the first basal, extending to the inner margin, the second rather broader, also extending to the inner margin, and emitting a short conical process at the origin of the first median veinlet, the third scarcely broader, extending to the median vein, the fourth narrower, triangular, reaching or all but reaching the median vein, the fifth much the broadest of all, triangular, divided anteriorly into two forks by a curved narrow decreasing and interrupted band of the ground-colour running from the costal vein to the third median veinlet, extending to the inner margin, separated from the black outer marginal band by a band of the ground-colour divided by the black veins and very slightly if at all narrowing from the anterior margin up to the second median veinlet, whence it gradually decreases in width and distinctness to the inner angle; all these black bands connected at the anterior margin, and the first, second, and fifth of them at the inner margin also, by a very narrow edging of black.

Posterior wings with two black bands commencing and connected at the anterior margin and coinciding with bands of the underside, one basal, extending to the end of the first half of the first median veinlet, and the other discal, extending a short distance into the space between the 2nd and 3rd median veinlets; with a small black spot near the end of the cell scarcely distinct from the discal band; with four discal spots immediately beyond the cell running nearly parallel with the band, the first and largest transversly elongated and coinciding with a spot on the underside, the rest smaller than the corresponding ones on the underside, which latter are consequently seen through the wing-membrane beyond the margins of the former; with a black spot succeeded by one of luteous at the anal angle; with a marginal and submarginal series of black lunules coalescent in the anterior third but more distinct in the posterior two-thirds of the wing, where the two series are more or less separated from one another by ashy-grey scales continuous with the ashy patch occupying the outer third of the wing and extending also along so as to obscure the ultra-cellular part of the basal black band; with the discal band and spots more or less irrorated and obscured with ashy-grey scales so that the disk of the wing appears mottled with black and grey; and with the black tails, as also the incisures, margined with cretaceous-white.

Wings below pure white, anterior ones marked as above, with the ground-colour at the base and between the black bands as far as the median vein and its second branch yellowish; with the band of ground-colour separating the fifth black band from the black outer border distinct, and not decreasing but on the contrary rather increasing in breadth, to the inner angle; and with the curved line dividing the fifth black band into two forks more distinct and less discontinuous.

Posterior wings, from the base up to the median vein and the discal black band, yellowish, with three black bands, one narrow running from the insertion along the inner margin close to the abdominal fold, and two broader commencing and connected at the anterior margin and cutting the cell, one of these latter basal, extending nearly to the end of the basal half of the first median veinlet, and the other discal, some distance into the space between the 2nd and 3rd median veinlets, the two first of the three bands connected together at their outer extremities and with two largish coalescent black spots in the anal region; with a small black spot near the extremity of the cell, and six of the same colour immediately beyond it disposed in a line which runs straight from the costal vein as far as the cell, but then curves abruptly inwards, the first of these spots transversely elongated, extending from vein to vein, and connected with the second, which is roundish and itself connected with the discal band, the third oval, about one-third the size of the second, and touching the discocellular veinlet, the fourth twice the size of the third, in contact with the median vein and its two last branches, the fifth rather smaller than the third, the sixth crescentic and connected with the two above-mentioned large spots in the anal region; with six large diffused luteous blotches externally margined with black, and increasing in size and depth of colour from the anterior to the inner margin; with the ground-colour between these blotches and the discal black spots pure white; with an increasing series of six marginal lunules, between which and the wavy black margins of the luteous blotches the ground-colour is white in the anterior and grey or greyish-white in the posterior portion of the wings; and with the incisures and the tails margined with lutescent.

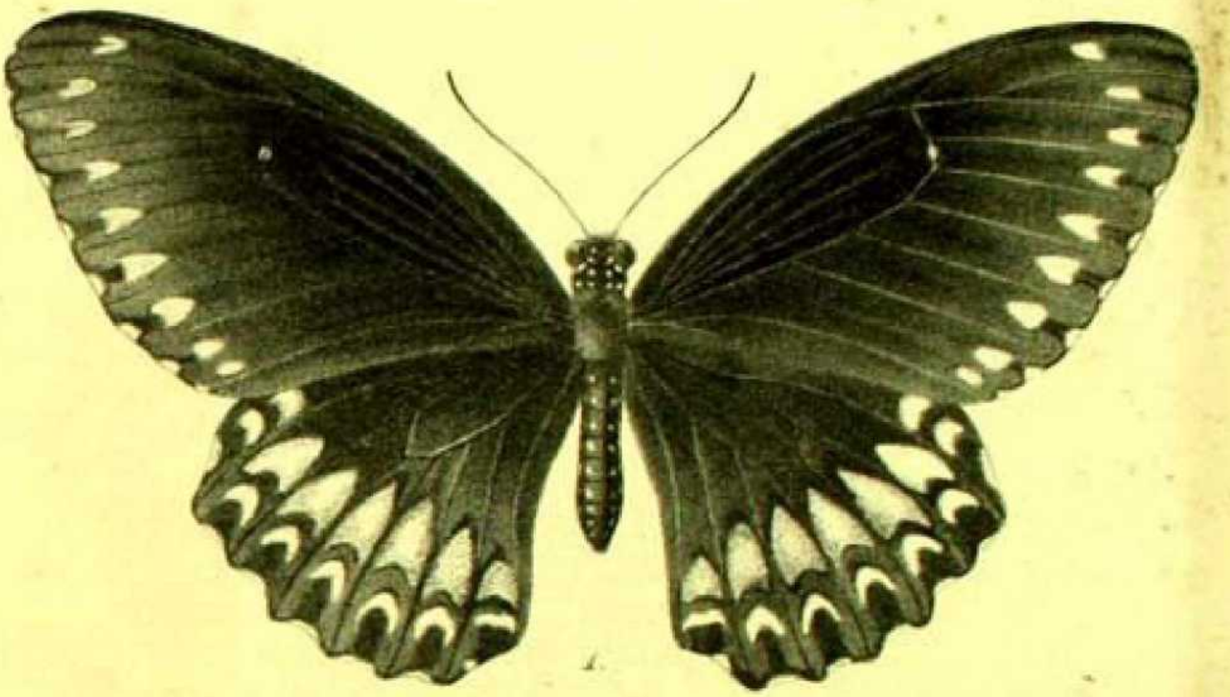
Head black with two white frontal bands; collar with a luteous spot on each side; thorax above jet-black ornamented at the sides with long grey setæ, below cretaceous-white; abdomen cretaceous-white with a tapering dorsal black band and two lateral fuscous ones.

Length of anterior wing 1·7; whence expanse = 3·5 inches.

Hab. South Andaman. Two specimens, both males, obtained by Mr. A. R. de Roepstorff.

To mark its close relationship to *P. Antiphates,* I have called the species *P. Laestrygonum* after the mythical people over whom Antiphates is supposed to have reigned. It differs from its nearest ally in having the upperside much blacker (the bands of the forewing being broader, and the first, second, and fifth of them with the marginal one extending to the inner margin where they are all connected together by a very narrow black edging, and the disk of the hindwing mottled as it were by black and grey) and a much greater extent of grey and more highly developed marginal and submarginal lunules on the hind-wing; in the abdomen being dorsally banded with black and the thorax ornamented with grey setæ, &c.

P. S.—On the 17th Nov., after the above had been sent to press, the fourth part of M. Oberthür's work entitled 'E'tudes d' Entomologie' was received in the Indian Museum, and in it I find the same species described and figured under the name of *P. Epaminondas;* but, as it seems to me not quite certain whether this name was actually published before mine, I have left it to M. Oberthür to effect the change of names that will become necessary if the fourth part of his work should really have been issued to the public before June, 1880.



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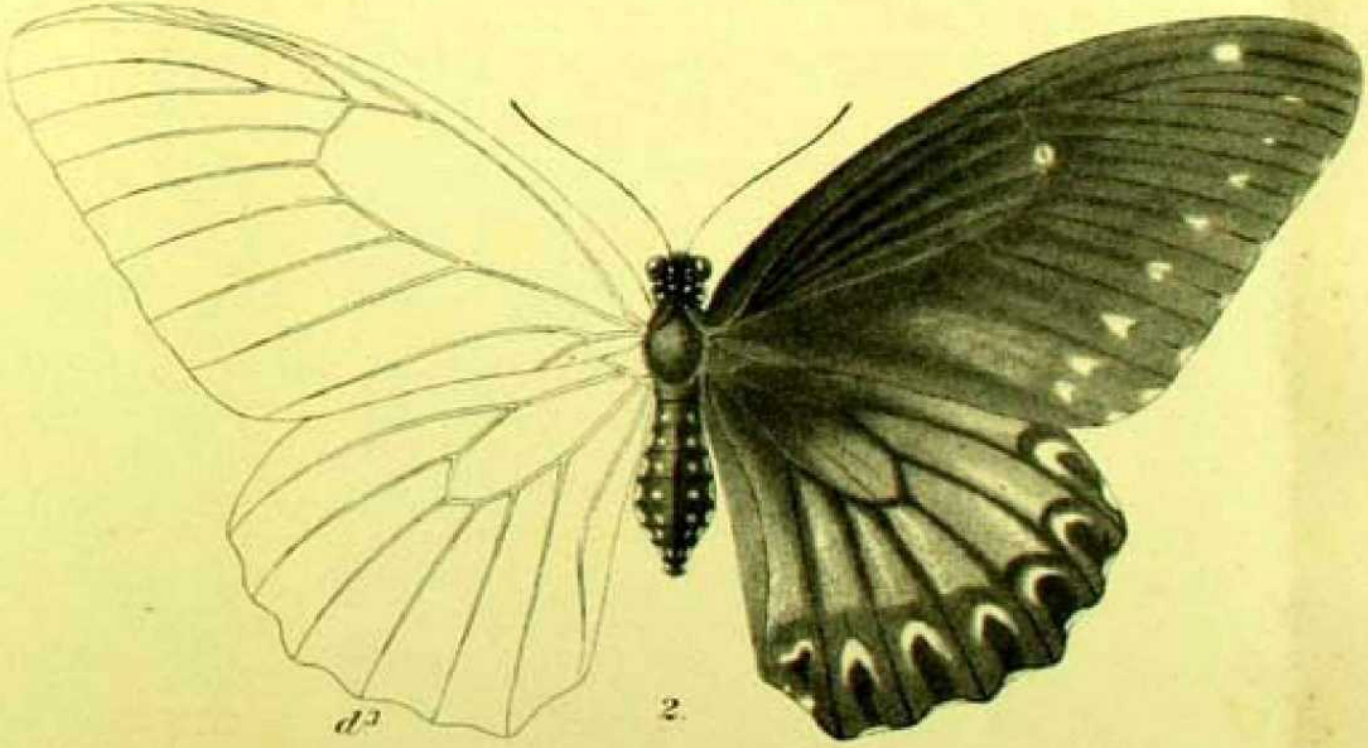
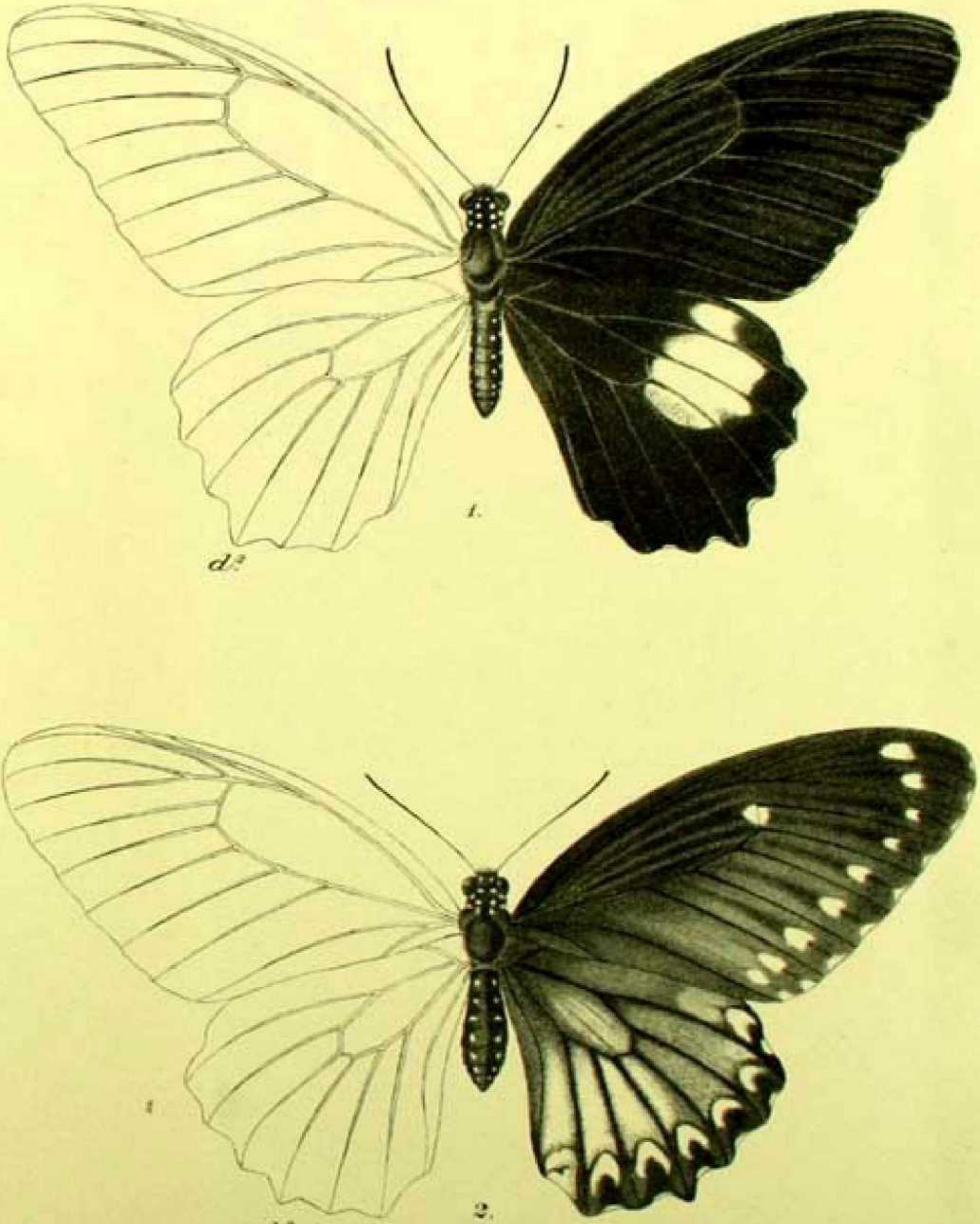


2.

B. L. Das del. J. Schaumburg Lith. W. Newman & Co. imp.

1. PAPILIO DRAVIDARUM, ♂.
2. PAPILIO CASTOR, ♀.

J. WOOD-MASON. Journ. As. Soc. Bengal. Vol. XLIX. Pt. II. 1880. Pl. IX



B. L. Dey del. J. Schaumburg Lith. W. Newman & Co. imp.

PAPILIO CASTOR. ♂ ♀.

Fig. 1.

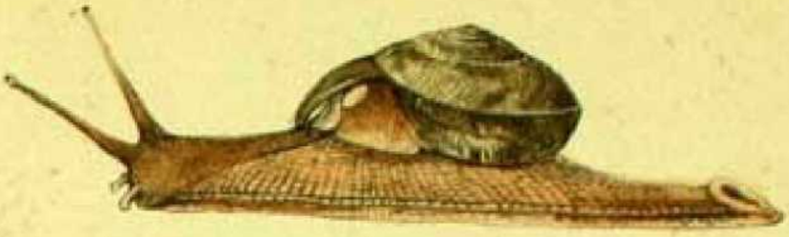


Fig. 1ª

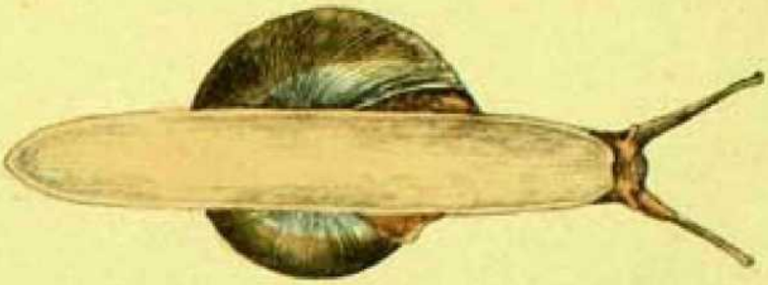


Fig. 2.

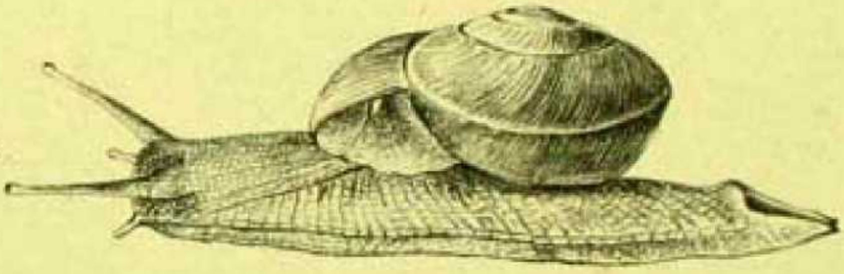


Fig. 3.

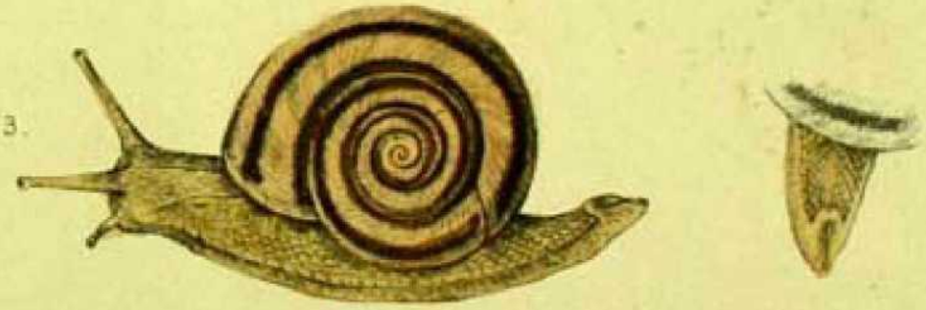
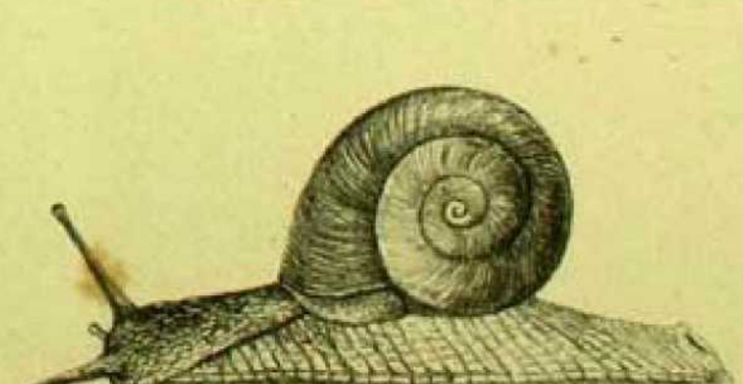


Fig. 4.



INDIAN ARIOPHANTA.

H. H. Godwin Austen. Delt.

Maclure & Macdonald Imp.

Fig. 1

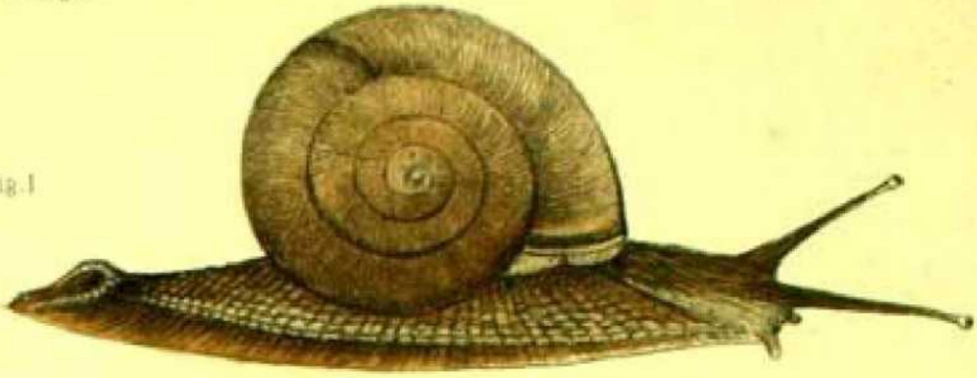


Fig. 1a

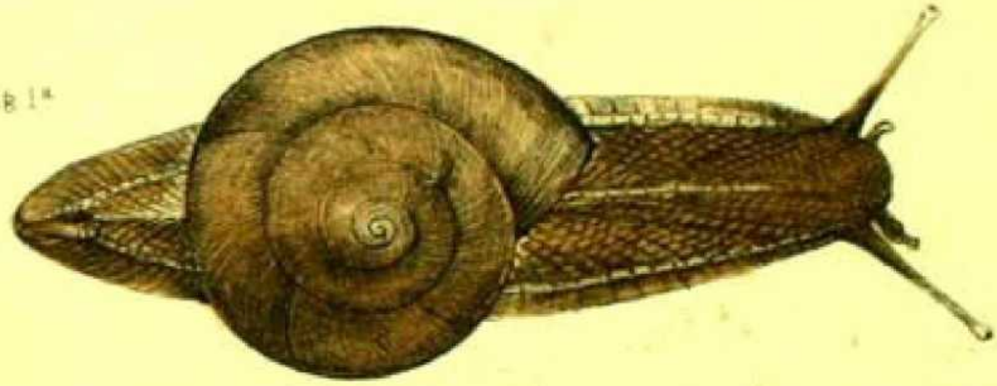


Fig. 2.

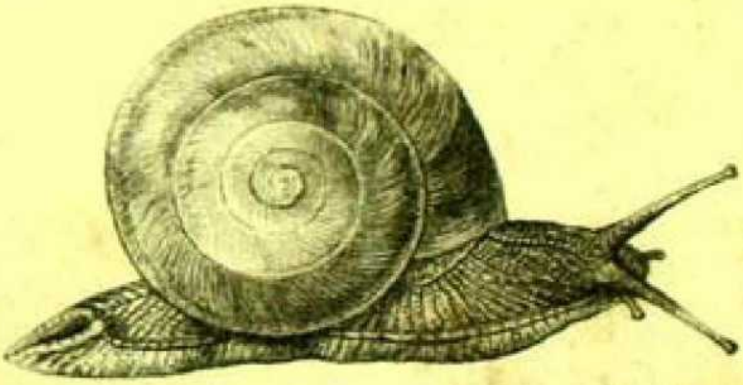


Fig. 3.

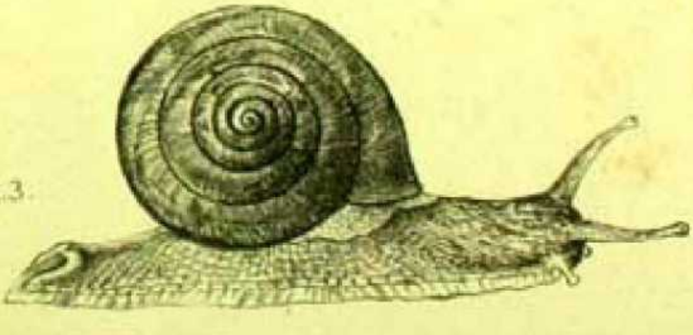
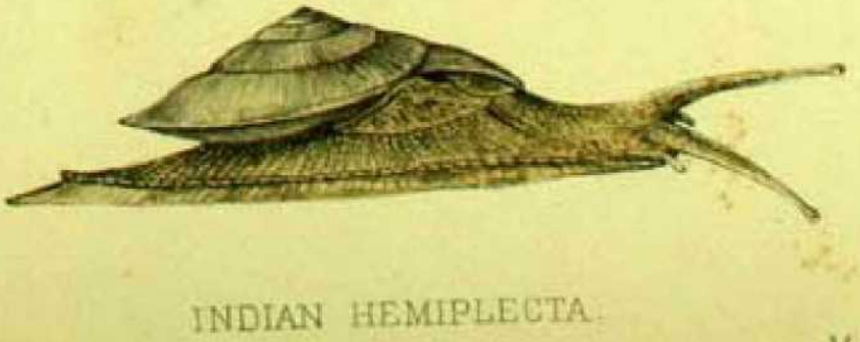


Fig. 4.



INDIAN HEMIPLECTA.

H.H Godwin-Austen Delt.

Maclure & Macdonald Imp.

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

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Part II.—PHYSICAL SCIENCE.

No. IV.—1880.

XX.—*Contributions to Indian Malacology, No.* XII. *Descriptions of new Land and Freshwater Shells from Southern and Western India, Burmah, the Andaman Islands, &c.*—*By* W. T. BLANFORD, F. R. S.

(Received Nov. 20th ;—Read December 1st, 1880.)

(With Plates II and III.)

More than ten years have elapsed since the last number of these 'Contributions' was published.* The time that I have been able to devote to Zoology in the interim has been occupied with other subjects, and several forms of Indian land-shells that have been in my possession for years have remained undescribed. Of a number of these, I had drawings made some years ago, and several of the figures that accompany the present paper were included in a plate prepared for publication as long since as 1871, but never lithographed.

These ten years have seen so many additions to the literature of Indian land and freshwater shells that the whole aspect of the study has been changed. Foremost in importance are the late Dr. Stoliczka's papers in this Journal† on the anatomy of several forms of *Helicidæ*. The untimely death of Dr. Stoliczka, one of the most able and energetic workers who ever devoted his attention to Indian Mollusca, has prevented the design he had formed of publishing a monograph of Indian *Cyclostomacea* from being carried out. A considerable number of drawings had been made for the work, in the preparation of which I had agreed to join, but of these drawings the most important, those representing the anatomy of the various genera, are not, I fear, sufficiently clear for publication in their present form, and notes to explain them are wanting. Some of the most useful of Dr. Stoliczka's anatomical studies, those on the structure of various *Helicidæ*, have, however, I am much pleased to say, been continued by Colonel Godwin-Austen with important results.

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* J. A. S. B., 1870, xxxix, pt. 2, pp. 9—25.

† Vol. xl, 1871, pt. 2, pp. 143, 217, and xlii, 1873, pt. 2, p. 11.

The same decade has seen the completion of a series of illustrations, many of them well executed, of Indian land and freshwater shells, the 'Conchologia Indica' of Hanley and Theobald. The work is mainly due to Mr. Hanley, upon whom the whole of the editorial labour has fallen, Mr. Theobald having been absent in India during the publication. Whilst it is impossible to avoid regretting that more complete illustrations of most of the species have not been given, and that some additional details have not been furnished in the accompanying letterpress,* it is unquestionable that the plates are a valuable contribution to the knowledge of Indian Mollusca.

Two other rather important works on Indian land and freshwater shells have been issued since the completion of the 'Conchologia Indica.' One of these is Mr. Theobald's 'Catalogue of the Land and Freshwater Shells of British India'†, the other, Mr. G. Nevill's 'Hand-list of the Mollusca in the Indian Museum, Calcutta', Part I.‡ The value and accuracy of the first-named work are unfortunately seriously diminished by the great number of misprints, errors, and omissions, partly due to the author's absence from Calcutta when the list was printed. Five quarto pages in small print are filled with additions and corrections ; this list, however, is not only far from being exhaustive, but contains some additions to the catalogue of mistakes.§ The 'Notes on the 'Conchologia Indica,'' p. 50, contain some important corrections of localities cited in that work.

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* One most important omission might yet perhaps be rectified. A large number of the figures are from types, or from typical examples, and, in such cases, if the figure is correct, there can be no question as to the determination of the species. But many of the figures are from shells that, although doubtless in general correctly identified, are not the specimens originally described, nor even in all cases from the same locality. A list of the figures taken from actual types would be useful in cases of disputed identity.

† Calcutta, 1876, published by Thacker, Spink and Co.

‡ Calcutta, 1878.

§ To justify my criticism of my friend Mr. Theobald's 'Catalogue', I will give two instances of the errors it contains. At p. 15, the genus *Omphalotropis* (with two species *O. distermina*, B. and *O. aurantiaca*, Desh., is placed in the family *Rissoidae*, subfamily *Pomatiopsinae*. At p. 43, the same genus *Omphalotropis* (with but one species *O. distermina*, B.) is repeated as a member of the family *Helicinidæ*, subfamily *Hydroceninae*.

Mr. Nevill's 'Hand-list of the Mollusca in the Indian Museum' is especially important for the large number of localities given. In some few instances (as in all such lists), some names will be found to require revision, and one or two instances will be given in the present paper. I have already[*] expressed my reasons for dissenting in some respects from the classification adopted. But it would be unfair to convey the impression that mistakes are numerous, indeed, considering that Mr. Nevill had not the advantage of correcting the proof-sheets himself, errors, so far as I have examined the work critically, appear singularly few in number, and in many points the classification adopted for the *Helicidæ* of India is a considerable improvement on anything that had previously been published. At the same time, there is, I believe, very much more to be done before these puzzling shells are properly arranged.[†]

In the various works just mentioned, some species are quoted by names given by me, at various times, in manuscript, but never published. Of these forms I have given descriptions in the following pages. In several instances, the shells have been figured in the 'Conchologia Indica.' One form thus figured (*Spiraculum mastersi*), I have already described in this Journal (vol. xlvi, 1877, pt. 2, p. 313), and two other species (*Cremnoconchus fairbanki* and *Corbicula iravadica*) represented in the same work require explanation. To facilitate reference, this is given below under the name of each shell.

This mistake is not corrected in the long list of 'Addenda et Corrigenda.' To shew how grave the error is, it is only necessary to mention that the *Rissoidae* are as distinct from the *Helicinidae* in organization as are the *Littorinidae* from the *Neritidae*, and that *Omphalotropis* has been clearly proved to belong to neither, but to the *Cyclostomidae* (See Ann. Mag. & Nat. Hist. May, 1865, ser. 4, vol. iii, p. 341). Moreover, the Indian locality of *Omphalotropis aurantiaca* had been shewn to be erroneous by Hanley in the 'Conchologia Indica.' The error was long since suggested by Benson (Ann. & Mag. Nat. Hist. Sept. 1851, ser. 2, vol. viii, p. 194).

The other error that I shall notice occurs in the 'Addenda et Corrigenda' and runs thus:—"Page 15, *add* ACMELLA HYDRIA, Godwin-Austen. North East Bengal." The reference quoted is 'Minutes of the Trustees, Imperial Museum,' Calcutta, vol. vii, p. 162. Now the minutes quoted are not published, but merely printed for record, and the notices contained in them of additions to the Museum are mere lists of the names that happen to be attached to specimens, inserted without any attempt at verification. Precisely the same is the case in the 'Register' at the British Museum. Had Mr. Theobald looked at the specimens, or had he made any enquiry about the shell, he would, I think, have easily learned that no such name as '*Acmella hydria*' was ever published, and that the shell so-called, was, if I am not mistaken, *Tricula montana*.

[*] Proc. A. S. B., 1879, p. 55.

[†] For instance, I cannot help doubting whether any of the numerous forms referred by Mr. Nevill to *Microcystis* are really congeneric with *H. ornatella* the type of the genus.

Of the remaining species here described, the majority have been collected by Colonel Beddome in the hill-tracts of Southern India. Some of these were sent to me as long as 9 or 10 years ago, others have been received more recently. I feel that I owe many apologies to Col. Beddome and to the other gentlemen, Dr. Anderson, Col. Evezard, and Col. Godwin-Austen, who have kindly entrusted me with the description of their discoveries, for leaving these so long unnoticed.

The plates accompanying the present paper are unfortunately deficient in many respects. Several species are not represented, and some of the representations given are far from being good. The original drawings were, in all cases, excellent, but some of them may, after being kept for several years, have become indistinct in parts, and as the lithographer had not the shells for comparison, he may have misunderstood the details. The larger shells represented in plate iii. are fairly well delineated, but several of the small forms in plate ii. are more or less faulty.

The importance of a careful study of the anatomy in the different forms of *Helicidæ* has already been mentioned. Very much remains to be done before anything like a correct classification of the family can be practicable. That all the forms referred to *Nanina* (a name which has no claim to recognition) must be separated from *Helix* is clear enough; the animals belong to different subfamilies at least, but it is by no means certain how many real generic groups there are in the so-called *Nanina.* I suspect that *Macrochlamys*, very possibly with some of the forms referred by Stoliczka to *Rotula*,* will have to be separated generically from another group comprising the sections known as *Hemiplecta* and *Ariophanta*, which are very closely allied to each other, and which are probably congeneric with *Xesta* and several other forms. For the present, I have simply referred the species described to the sections to which they appear to belong, as Stoliczka did, but I am by no means prepared to follow him in accepting such sections as of generic rank. The difficulty is to determine what generic name or names should be adopted. *Nanina* is utterly bad; it offends every law; the name had been used previously by Risso;† the type is the same as that of Benson's genus *Macrochlamys;* and the term is objectionable on account of its signification. All this has been pointed out by Martens,‡ but still he and others employ the name because it has crept into use. Now, in such difficult matters as these generic terms, unless rules are strictly attended to, utter confusion must result, and undoubtedly it has resulted. When, however, a search is made for a better founded term then *Nanina*, endless difficulties are encountered. The earliest name is *Helicarion* of Ferussac (1822), but it is far from clear that this is not generically distinct from both *Macrochlamys* and *Ariophanta*. The next term is *Stenopus* of Guilding (1828), applied to a West Indian shell. This genus is evidently closely allied to the so-called *Nanina:* the only distinction pointed out by H. and A. Adams* is that the sole in *Stenopus* is narrower than the sides of the foot, but this does not hold good universally.† A better difference is probably the position of the genital orifice, which appears to be, in *Stenopus*, some distance behind the head, as in *Zonites*, and not just behind the right tentacle, as in '*Nanina.*' After *Stenopus* follow *Macrochlamys* of Benson (1832) and *Ariophanta* of Desmoulins (1833), the first founded on *H. indica* (Benson *nec.* Pfr.), believed by many authors to be the same as *H. vitrinoides*, the second founded on *H. lævipes.* The name *Nanina* was given in 1834. My impression is that *Helicarion*, *Macrochlamys*, and *Ariophanta* will have to be accepted as genera, *Nanina* being merely a synonym of *Macrochlamys.*

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* These appear, however, to deserve distinction from true *Rotula*, see after.

† See Stoliczka, J. A. S. B., 1871, xl, pt. 2, p. 47.

‡ Albers Heliceen, 2te Ausgabe, p. 46, where the synonymy is fully discussed.

I must apologize for taking up space by repeating what has been often written before, but it is only right to explain why I now describe as *Hemiplecta*, *Euplecta*, &c. shells allied to others formerly in these 'Contributions' called *Nanina.*

1. ARIOPHANTA IMMERITA. Plate III, Fig. 4, 4*a*.

Nanina (Ariophanta) immerita, W. Blanf., J. A. S. B., 1870, xxxix. pt. 2, p. 17.

Helix immerita, Pfr., Mon. Hel. vii. p. 128; Hanley & Theobald, Conch. Ind. pl. cl, fig. 7.

This shell was originally described from an immature specimen, and the same was figured in the 'Conchologia Indica.' Subsequently, Col. Beddome obtained an adult shell from the same locality, South Canara. Of this example a figure is now given. The species only differs in sculpture from *A. interrupta*, which is found in various parts of Bengal‡ and Orissa, and has been procured by Col. Beddome as far south as the Golcondah range of hills in Vizagapatam. The two forms replace each other in the eastern and western parts of the Indian peninsula, precisely as do their allies *A. lævipes* and *A. laidlayana.*

2. OXYTES SYLVICOLA, sp. nov.

Testa perforata, depressa, carinata, solidula, oleoso-micans, epidermide crassiuscula obtecta fulva vel luteo-fusca, striis obliquis incrementi

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* Gen. Rec. Mollusca, ii, p. 221.

† *E. g.* in *Macrochlamys*, some forms of which at least have the central tract narrower than the lateral.

‡ Amongst the localities given in the 'Hand-list of Mollusca in the Indian Museum,' part i. p. 19, is Singhar. This cannot be Sinhgarh near Poona, in the Deccan.

atque lineis impressis minutis spiralibus subdistantibus superne decussata (nucleo sublævigata), subtus lævior sed distincte decussato-striata. Spira parum elevata depresso-conoidea, fere convexa, apice obtuso, suturâ lineari, antice vix impressâ. Anfr. 5½, *sensim accrescentes, primi planulati, ultimi convexiusculi, ultimus haud descendens, subtus convexus, modice inflatus, sed infra carinam, nisi juxta aperturam, leviter compressus. Apertura obliqua, angulata-lunaris, intus livido-albida ; peristoma acutum, intus subincrassato-labiatum, marginibus callo tenui junctis, columellari curvato, breviter reflexo. Diam. maj.* 32, *min.* 29, *axis* 17 *mm. Apert.* 16½ *mm. lata,* 13½ *oblique alta.*

HAB. In montibus 'Burail Range' dictis, ad alt. 3000-4000 pedum, in provincia 'North Cachar' Bengaliæ orientalis (*H. H. Godwin-Austen*).

Shell perforate, depressed, carinate, not very thin, having a greasy lustre, and a thick epidermis, tawny or yellowish brown, marked with oblique raised striæ of growth decussated by fine subdistant spiral impressed lines above (the nucleus almost smooth), and with fainter radiating striæ and concentric impressed lines below. Spire but little raised, almost convex, depressedly conoid, apex obtuse, suture linear at first, but slightly impressed near the mouth. Whorls 5½, gradually increasing, the inner nearly flat above, the outer slightly convex ; the last not descending, convex and moderately swollen below, but slightly compressed just below the keel, except near the mouth. Aperture oblique, angulately lunate, a little broader than high, pale livid within. Peristome sharp, with a slightly thickened lip inside, the margins joined by a thin callus, columellar margin curved, reflected for a short distance at the perforation. Major diameter 1·26 inches, minor 1·14, axis 0·69, breadth of aperture 0·65, height (measured obliquely) 0·53.

There is a very remarkable resemblance between this shell and that described by me as *Nanina koondaensis* (J. A. S. B., 1870, xxxix, pt. 2, p. 16, pl. iii, fig. 12), yet I am by no means sure that both belong to the same section or subgeneric group. *N. koondaensis* is an ally of *N. indica* (Pfr.) and *N. shiplayi*, shells doubtless nearly allied to *Hemiplecta*, and very possibly belonging to that subgenus, but hitherto referred to *Rotula*,* or to other sections. *O. sylvicola* is larger, more solid, and covered with a distinct epidermis, and the sculpture is less granulate above, the spiral impressed lines being more distant.

I have seen but one specimen of *O. sylvicola*, for which I am indebted to Col. Godwin-Austen. It is figured here. Other specimens, I learn, are larger.

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* Stoliczka, J. A. S. B., 1871, xl, pt. 2, 231.

3. HEMIPLECTA TINOSTOMA, sp. nov., Plate III, Fig. 1.

Testa anguste umbilicata, convexo-depressa, confertim striis spiralibus minutis lineisque incrementi decussata; fulva, lineâ pallidâ angustâ supra peripheriam, alterâ fuscâ infra, cincta; subtus pallidior, lævior, nitidula. Spira convexa, apice obtuso, suturâ primum lineari, antice impressâ. Anfr. 5, *planiusculi, sensim accrescentes; ultimus convexior, antice latior subascendens, ad peripheriam angulatus, subtus convexus, aperturam versus planulatus. Apertura obliqua, multo latior quam alta, lunato-oblonga, intus albescens, fasciâ peripherali albidâ conspicuâ; peristomatis marginibus subparallelis, callo tenui junctis, basali albo, recto, crassiusculo, longe obliquo, ad umbilicum subreflexo, supero arcuato, leviter inflexo. Diam. maj.* 50, *min.* 39, *axis* 21 *mm.; apert.* 28 *mm. lata,* 18 *oblique alta.*

HAB. In montibus 'Tinnevelly Ghats' dictis Indiæ meridionalis, ad latus orientale provinciæ Travancore (*H. Beddome*).

Shell narrowly umbilicate, convexly depressed, closely decussated with fine spiral striæ and lines of growth, smoother beneath, yellowish brown above, paler below, surrounded by a narrow pale line just above the periphery and a dark line below. Spire convex, apex obtuse; suture at first flat, becoming impressed towards the mouth. Whorls 5, the first nearly flat; the last convex above, becoming more so towards the aperture, where it is rather broader and rises a little; below, the shell is convex, but flattened near the mouth, and the greater breadth of the last whorl near the aperture is more conspicuous than above. Aperture oblique, much wider than high, brownish livid, with a whitish enamel within, the pale peripheral band being conspicuous; peristome slightly sinuate, the upper and lower margins nearly parallel, the former slightly inflexed, the latter oblique, straight, white, and somewhat thicker than the other margins. Major diameter 2 inches, minor 1·55, axis 0·85; breadth of aperture 1·1, height (measured obliquely) 0·72.

This shell somewhat resembles *H. basilessa* and *H. beddomei*, but differs from both in the peculiar form of the aperture and the great flattening of the last whorl beneath. The fine, decussated, almost granulate sculpture of the present species, and the less rapid increase of the last whorls would serve to distinguish it from either of the forms named, even if the peculiar shape of the aperture proved to be an individual peculiarity—not a very probable supposition, as there is a faint approach to the same change of form in the last whorl in *H. basilessa*..

But a single specimen has been procured by Col. H. Beddome, and entrusted to me for description. This shell was obtained on the Tinnevelly Ghats, between Tinnevelly and Travancore, at a spot east of Papanassam, and at an elevation of 5000 feet.

4. HEMIPLECTA ENISA, sp. nov., Plate III, Fig. 2, 2*a*.

Testa anguste umbilicata, depressa, subcarinata, fulvo-castanea, subtus pallidior; fasciâ exiguâ peripherali albidâ circumdata, confertim striis incrementi lineisque minutis spiralibus subgranulatim decussata, circa umbilicum lævior. Spira depresso-convexa, apice obtuso, suturâ primum lineari, antice impressâ. Anfr. 4½, *planiusculi, sensim accrescentes: ultimus superne magis convexus, ad peripheriam subangulatus, antice latior, subtus convexus, juxta aperturam paululo compressus. Apertura obliqua, latior quam alta, lunato-oblonga, supra peripheriam subangulata, intus pallide livida, fasciâ peripherali albescente conspicuâ; peristomatis marginibus subparallelis, callo tenui granulato junctis, supero externoque arcuatis, haud inflexis vel incrassatis, basali albo, recto, obtuso, longe obliquo, ad umbilicum subreflexo. Diam. maj.* 42½, *min.* 36, *axis* 20 *mm.; apertura* 23 *lata*, 17 *oblique alta.*

HAB. In montibus 'Aghastyamullay' dictis, inter provincias Tinnevelley atque Travancore, in Indiâ meridionali (*H. Beddome*).

Shell narrowly umbilicate, depressed, subcarinate, yellowish chestnut, paler and dull yellow below around the umbilicus, surrounded by a narrow pale band, which is only well marked near the mouth; the sculpture is fine and subgranulate, formed by decussating striæ of growth and fine spiral lines, the latter disappearing below near the umbilicus. Spire depressedly convex, apex obtuse; suture linear, and not impressed, except in the anterior half of the last whorl. Whorls 4½, all except the last flat, gradually increasing; the last whorl more convex above, especially towards the mouth, where it is slightly broader, subangulate at the periphery, convex below, but a little compressed close to the mouth. Aperture oblique, broader than high, lunately semioval, subangulate at the upper portion of the outer edge, pale livid within, with the narrow whitish band along the blunt keel very conspicuous. The peristome is not thickened, except very slightly along the basal margin, which is white, oblique, and straight for a considerable distance, being very slightly reflected at the umbilicus; the other margins are regularly convex, the upper and lower margins being subparallel; the callus connecting the free margins of the aperture is thin, but granular. Major diameter 1·72 inches, minor 1·4, axis 0·8; aperture 0·95 inch broad, 0·68 high (measured obliquely).

Col. Beddome has sent to me two specimens of this shell, one adult, the other not quite fully grown. The species is near *H. tinostoma*, but is considerably smaller, and the peculiar flattening and compression of the last whorl, near the mouth, is far less, the aperture being, in consequence, not nearly so broad in proportion to the height. Another allied form, also from Travancore, is *H. basilessa*; but this is a thicker shell, with broader whorls and rather a thick lip to the aperture; the sculpture, too, is different. None of the remaining species of *Hemiplecta* occurring in the Malabar province have the mouth compressed.

5. XESTINA* ALBATA, sp. nov., Pl. III, Fig. 3, 3*a*., 3*b*.

Testa angustissime atque subobtecte umbilicata, depresso-globosa, solidiuscula, rugoso-striata, lineis impressis distantibus spiralibus superne circumdata, albida, eburnea. Spira depresso-conica, apice obtuso, suturâ impressâ. Anfr. 5½, *convexiusculi, sensim accrescentes, primi translucentes, sublævigati; ultimus primum, nec antice, ad peripheriam subangulatus, aperturam versus latior, vix descendens, subtus subinflatus. Apertura obliqua, late lunaris; peristomate superne simplici, extus subtusque subreflexo, juxta umbilicum reflexo atque subincrassato, margine basali arcuato. Diam. maj.* 29, *min.* 23½, *axis* 17½ *mm.; apert. intus* 15 *lata,* 14 *oblique alta.*

HAB. Ad Papanassam, in montibus ad latus occidentale provinciæ Tinnevelly, Indiæ meridionalis (*H. Beddome*).

Shell very narrowly and subobtectly umbilicate, depressedly globose, subangulate at the periphery, rather solid, ivory-white, the surface wrinkled, forming a coarse oblique striation across the whorls, with fine spiral distant impressed lines on the upper surface only of the two last whorls. Spire depressedly conical, apex obtuse, suture impressed. Whorls 5½, slightly convex, regularly increasing, the first almost smooth and translucent; the last whorl at first subangulate at the periphery, the angulation disappearing some distance behind the mouth, the lower portion inflated near the aperture, which is oblique and broadly lunate. Peristome simple above, subreflected on the outer and basal margins, rather thicker and turned back near the umbilicus, which it partly covers; the basal margin is curved forwards. Major diameter 1·5 inch, minor 0·95 axis 0·7; breadth of aperture inside 0·6, height (measured obliquely) 0·56.

This form is allied to *X. maderaspatana* (*Helix maderaspatana*, auct.), but it is thicker, much more coarsely sculptured, and white in colour. The peristome too is slightly reflected. There is some resemblance also to *X. belangeri* in form, but the mouth is somewhat differently shaped, and the sculpture of *X. albata* is coarser. *X. belangeri* appears to be a near ally of *X. tranquebarica*, *semirugata*, and *bombayana*, forms differing in shape, but so variable and so closely allied that it is very doubtful whether they really merit distinction. All of these forms have a horny shell differing from the ivory-white substance of the species now described.

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* Pfeiffer, J. B. Jahrbuch d. Mal. Ges. v, p. 257.

But a single specimen has been sent by Col. Beddome. I think I have seen the same, or a very similar form, from either the Pulneys or some other range of Southern India; but I cannot find specimens in my collection.

6. EUPLECTA VIDUA. Plate II, Fig. 5.

Helix vidua, W. Bl., MSS.; Hanley, Conchologia Indica, pl. cxxx. figs. 2, 3.

Nanina climacterica, Bens., var. *vidua*, Nevill, Hand-list Mollusca, Indian Museum, Calcutta, pt. i. p. 30.

Testa imperforata, conoideo-depressa, superne oblique confertim atque arcuatim filiformi-costulata, subtus lævigata, polita, radiatim striatula, superne pallide cornea, subtus pallidior. Spira depresso-conica, lateribus subrectis, apice acutiusculo, suturâ impressâ. Anfr. 8, *convexi, arcti, lente accrescentes; ultimus superne ad peripheriam angulatus, antice vix descendens, subtus convexus. Apertura obliqua, lunaris, latior quam alta. Peristoma obtusum, leviter sinuatum, intus vix albo-labiatum, margine basali arcuato, columellari vix reflexo. Diam. maj.* 17, *min.* 15½, *axis* 9½, *mm.*

HAB. In montibus Garo Khasi et Naga dictis, vallem Assamensem meridiem versus contingens (*Masters, Godwin-Austen*).

Varietas minor, depresso-turbinata, spirâ conicâ. Diam. maj. 14, *min.* 12½, *axis* 9 *mm.* (Pl. II, Fig. 2.)

HAB. Cum præcedente.

Shell imperforate, conoidly depressed, above ornamented with oblique, close, and arcuate fine hair-like costulation, smooth and marked with radiating striæ below; pale horny, paler beneath. Spire depressedly conical, the sides nearly straight, apex rather sharp, suture impressed. Whorls 8, convex, narrow, slowly increasing in size, the last angulate above at the periphery, scarcely descending towards the mouth, convex below. Aperture oblique, lunate, broader than high. Peristome not sharp, slightly wavy, with a very slight white thickening inside, the basal margin curved forward, the columellar scarcely reflected. Major diameter 0·67, minor 0·62, axis 0·38 inch.

The above is the typical form; but there is a smaller variety, depressedly turbinate in shape, with the spire conical, measuring 0·55 inch in its major diameter and 0·36 in height. This form passes by insensible gradations into the type.

The shell represented in the 'Conchologia Indica' is intermediate between the two varieties here described and figured; the apex in the 'Conchologia' figure is more prominent and blunt than in the specimens now before me. These were procured from the Naga hills, south of Gola Ghat, Assam, by Mr. Masters in 1859; other specimens were subsequently found on the Garo, Khasi, and Naga hills by Colonel Godwin-Austen. The shells from the Khasi hills have the filiform costulation on the upper surface finer and less regular than those from the Assam side of the Naga hills. In Khasi shells 2, 3, or 4 ribs occur at nearly regular intervals, and then a rib appears to be omitted; this is not the case with those from upper Assam.

The species scarcely differs from *E. ornatissima*, found on the other side of the Brahmaputra valley at the base of the Sikkim hills, except in being imperforate. *E. climacterica*, of which Mr. Nevill considers the present shell a variety, is always sharply keeled at the periphery. The two forms may pass into each other, but I have never seen any intermediate links; and as they differ from each other much more than *E. vidua* does from *E. ornatissima*, or *E. climacterica* from *E. austeni*, it is better to have distinctive names for them.

I am indebted to Col. Godwin-Austen for the following note on the animal of *E. vidua* observed at Cherra Poonjee, Khasi hills.

"Animal of a neutral grey tint about the neck and eye-tentacles, which are rather long and fine, the oral tentacles are also of a dark tinge. Extremity of foot truncated, with mucous gland. Body long and thin. No tongue-like processes to the mantle observed."

The genus *Euplecta* was proposed by Semper* for two Ceylonese shells *Helix subopaca* and *H. layardi*. The latter of these is referred by both Theobald† and Nevill‡ to *Situla*, a position which is scarcely tenable, for the animal of *H. layardi* is destitute of shell-lobes, whilst these are present in *Situla*§; and the odontophores are very different, neither the shape nor number of the teeth being similar. At the same time, I am rather doubtful whether *H. layardi* should not be placed in a separate section from *H. subopaca* on account of differences both in the shell and odontophore. The last-named species, however, is, I think, to be accepted as type. It is greatly to be regretted that Semper should have adopted so loose and uncertain a proceeding as to name two distinct forms as types of one genus. In such a case, the only plan is to take the first-named—in this case, *H. subopaca*—as the type of *Euplecta*.

The genus is thus defined by its author in German:—*On the mantle edge only neck-lobes are present, the left is divided into two separate lappets (as in many Helices). Above the caudal gland there is a short horn. The shell entirely exterior, ribbed or striated above, smooth below. On the*

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* Reisen im Archipel der Philippinen, 2te theil, Wis. Res. vol. iii, p. 14.

† Cat. p. 20.

‡ Hand-list, p. 34.

§ See, for description of the animal and odontophore of *Situla* (or *Conulema*, which is the same), Stoliczka, J. A. S. B., 1871, vol. xl, pt. 2, p. 236.

genital organs a cylindrical female supplementary gland (Anhangsdrüse) *with a cartilaginous point* (*analogous to the dart?*) *; on the* vas deferens (Samenleiter) *a closed appendage, in which calcareous concretions are formed, and a flagellum.*

The odontophore is not noticed in the generic description. In *E. subopaca*, the number of teeth in each cross-row is about 100, central tooth tricuspid, the neighbouring laterals 12 in number distinctly bicuspid, from the 13th to the 24th almost without a trace of the little lateral point, which, however, reappears in the outer laterals. *Euplecta* belongs to Semper's subdivision *Ceratophora* with a horn-like lobe above the caudal gland, and the sole of the foot divided into a central and two lateral regions as in *Macrochlamys* (and *Stenopus*).

In the characters of both shell and animal, so far as we know the latter, there is a remarkable resemblance between *E. subopaca* and *E. vidua*. The connection between *E. vidua* and *E. climacterica* has already been noticed, and in the latter the odontophore (of which Col. Godwin-Austen has kindly furnished me with notes and drawings) agrees very closely with that of *E. subopaca*. The following is a description of the teeth in *E. climacterica* :—

"Median tooth tricuspid, the central point very long, the lateral cusps very small. The first 14 laterals are long and broad with a single short small cusp on the lower outer margin, the 25 outermost are long narrow, curvilinear, bicuspid, the outer point the shorter, being less than half as long as the inner. Jaw slightly curved, the front edge a little convex."

The number of teeth in a row is apparently 79. A sketch shews that the form of both central tooth and laterals is very similar to that in *E. subopaca*.

Euplecta is by Semper classed apart from *Rotula*. The animal of the type of this latter genus (*H. detecta*, from Bourbon) is still unknown. Semper has described the anatomy of two very different species, and there is no proof that they are congeneric. It is also extremely doubtful whether, of the forms referred to *Rotula* by Stoliczka,[*] any belong really to the section; and I am disposed to believe that Nevill was right in removing them in his 'Hand-list,' where, however,[†] he simply classes them in *Nanina* without specifying any subgeneric group. Judging, it is true, chiefly from the shells, I should class the following Indian and Burmese species in *Euplecta* :—

Helix ponsa,[‡] Benson; from Burma.

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[*] J. A. S. B., 1871, xl, pt. 2, p. 231; 1873, xlii, pt. 2, p. 14.

[†] l. c. pp. 28, 29, 30, &c.

[‡] I find this short note on specimens of this species obtained in upper Burma in 1861:—Animal of the *vitrinoides* type, but the projecting lobe (*i. e.*, that above the caudal gland) is small.

Nanina sikrigallensis, Nevill; Bengal, Behar (Hand-list, p. 28).

Helix climacterica, Benson; Assam hills, Burma.

Euplecta vidua, Assam hills.

Nanina austeni. W. Bl.; Garo hills, Assam.

N. falcata, W. Bl.; Garo hills, Assam.

Helix ornatissima, Benson; base of Himalayas, Sikkim and Nipal.

Helix serrula also probably belongs to the same genus. About *H. anceps* and its near ally, *H. arata*, I am more doubtful; for there are shell-lobes to the mantle in the former, and the teeth of the odontophore differ in several particulars.*

As regards *H. indica* (Pfr. nec Benson), *H. shiplayi*, and *H. acuducta*, I cannot now find the notes I made many years since on the animals, but I believe they belong to the forms allied to *Ariophanta*, in which the foot is broad with the sole undivided, and there is no projecting lobe above the caudal gland. The shells present much resemblance to the type of Albers' section *Thalassia*. *H. tugurium* and *H. camura* from Sikkim are still more like *H. subrugata* from Australia, the type of *Thalassia*.

7. SESARA ? INGRAMI.

Helix ingrami, Blanford, Hanley, Conchologia Indica, pl. lx. figs. 9, 10.

Rotula diplodon, Bs., partim, Theobald, Cat. Land & Freshwater Shells Brit. Ind. p. 21.

Nanina (*Sesara ?*) *diplodon*, Bs., partim, Nevill, Handlist Moll. Ind. Mus. pt. i. p. 53.

Testa imperforata, trochiformis, tenuis, diaphana, pallide cornea, minutissime atque confertissime granulatim decussato-striata. Spira subconica, lateribus convexiusculi, apice obtuso, suturâ parum impressâ, lineâ filiformi marginatâ. Anfr. 6½, *regulariter accrescentes, vix convexiusculi, superiores lævigati; ultimus acute carinatus, non descendens, et supra et infra carinam compressus, basi extus decussato-striatus, atque, præsertim antice, aperturam versus, planulatus, intus convexiusculus atque lævigatus, striis medium versus evanescentibus, regione umbilicali impressâ. Apertura diagonalis, incurvo-triangularis, intus tridentatus, dentibus lamelliformibus omnibus basalibus, duobus in peristomate, uno majori falcato intrante, extus convexo, in medio margine basali, alio minori obliquo subcolumellari, tertio profundo, incurvo, transversim post majorem posito. Peristoma album, modice incrassatum, margine basali sinistrorsum arcuato, dextrorsum subangulatim sinuato, columellari vix reflexo. Diam. maj.* 6½, *min. vix* 6, *alt.* 4½.

HAB. In montibus 'Yoma' dictis, Pegu ab Arakan secernentibus, haud procul a vico Tongoop.

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* Stoliczka, J. A. S. B., 1871, xl, pt. 2, pp. 234, 236.

Shell imperforate, trochiform, thin, translucent, pale horny, very minutely and closely striated both obliquely and spirally, so as to be covered, except on the upper whorls, with fine almost granular decussated sculpture. Spire nearly conical, with the sides slightly convex; apex obtuse; suture very little impressed, and with a filiform line above, the continuation of the keel on the last whorl. Whorls 6¼, increasing regularly, nearly flat, only a little convex, the uppermost quite smooth, the sculpture growing stronger on the lower whorls; the last whorl sharply keeled, not descending, compressed both above and below the keel, with the outer portion of the base flat, especially towards the mouth, and decussated, the inner portion moderately convex and smooth, the sculpture gradually disappearing towards the middle; umbilical region impressed. Aperture diagonal, triangular with the sides curved, with three lamelliform teeth inside, all palatal, and in the basal margin: the largest is in the middle of the margin, and is much curved, with its convex side outwards; it begins by forming a kind of thickening to the lip, and then curves away into the interior of the whorl; the second is smaller, oblique, and situated near to the columellar margin; the third is at some distance within the aperture, it is curved, and placed transversely behind the first. Peristome white, somewhat thickened, the basal margin curved forwards near the umbilical region, and angulately curved back near the periphery of the shell; columellar margin scarcely reflected. Major diameter 0·25, minor 0·23, height 0·18 inch.

In the figure in the 'Conchologia Indica,' the internal tooth is not shown, although all the teeth are clearly seen through the semi-transparent base of the shell.

The caudal pore in the animal is very small, and furnished with a lobe in front of it, but the tail is not truncated abruptly as in *Macrochlamys.* This is the only note I can find on the soft parts.

This shell was named in MS. in the year 1861, and a specimen transmitted to Mr. Benson, who, however, doubted whether it could be distinguished from the Khasi-hill form described by him as *Helix diplodon.* The typical specimen of the latter must, I think, have been in poor condition, for it was described as "*lævigata, parum striatula*", whereas fresh specimens exhibit nearly the same fine subgranulate decussating striation as *S.? ingrami*, and Mr. Benson very probably, and very justly, thought that fresh specimens might agree with the Arakan shell in other characters. Subsequently, fresh specimens of *S.? diplodon* were obtained from the original locality by Colonel Godwin-Austen; and I find that they differ from *S.? ingrami* not only in being minutely perforate, a character to which by itself I should attach little or no importance, but also in having but two teeth in the aperture instead of three, the internal transverse tooth of *S.? ingrami* being deficient in *S.? diplodon,* whilst the other teeth are differently shaped. The sculpture is somewhat finer in *S. ? diplodon*, and the basal margin of the aperture is subangularly concave, without the curving forwards due to the transverse portion of the larger tooth in *S. ingrami*. The last character is well shown in the 'Conchologia' figure.

8. MACROCHLAMYS ? PLATYCHLAMYS, sp. nov., Plate II, Fig. 9.

Testa perforata, conoideo-depressa, pertenuis, nitida, lævigata, sub lente obsolete striatula, fulvo-cornea. Spira parum elevata, apice obtuso, suturâ levi aliquando marginatâ. Anfr. 5, vix convexiusculi, regulariter accrescentes; ultimus non descendens, peripheriâ rotundatus, subtus convexus. Apertura obliqua, lunaris, latior quam alta. Peristoma tenue, simplex, leviter sinuatum, marginibus remotis, callo tenuissimo junctis, columellari brevissime verticali, peranguste reflexo. Diam. maj. 11, *min.* 9½, *axis* 5½.

Animal pallio maximo indutum, duos lobos latos linguiformes emittente, qui spiram testæ omnino circumtegunt.

HAB. Ad Bombay.

Shell perforate, conoidly depressed, very thin, smooth, and polished, obsoletely striated beneath the lens, fulvous horny in colour. Spire subconical, but little raised, apex obtuse; suture smooth, scarcely impressed, sometimes marginate. Whorls 5, very slighly convex, regularly increasing in size, the last not descending, rounded at the periphery, convex below. Aperture oblique, lunate, broader than high. Peristome thin, simple, slightly curved when viewed from the side; margins distant and united by a thin callus; the columellar border vertical for a very short distance, slightly reflexed. Major diameter 0·44, minor 0·38, axis 0·22 inch.

This shell belongs to the group of thin, more or less depressed forms allied to the type usually known as *M. vitrinoides* (*M. indicus*, Benson). It appears, so far as I can see, to be undescribed, as is also, I believe, an allied form of darker colour, and with a subangulate periphery, occurring at Trichinopoly and elsewhere in the neighbourhood of the Coromandel coast south of Madras.

The animal of *M. platychlamys* is chiefly distinguished by the peculiarly broad shell-lobes, which, instead of being narrow and attenuate towards the ends, as in most allied species, are broad and flat, so as sometimes to cover the whole spire, and usually to conceal all except a narrow band. These lobes somewhat resemble those in the genus *Helicarion*. The lobe above the caudal gland is very much smaller than it usually is in *Macrochlamys* and rounded, not horn-shaped.

This shell is common in the island of Bombay and neighbouring lowlands on the west coast of India, and I have seen a form from the hills of the Wynaad in Southern India that appears undistinguishable. I have also several specimens of a *Macrochlamys* from the ancient town of Champanir, near Broach, that may very possibly be a variety of *M platychlamys.* The specimens are larger than the Bombay types, an adult measuring 16 mm. by 14 in its two diameters, and some individuals attain even greater dimensions; the mouth too is rather more convex beneath, but otherwise the two forms agree very closely.

The figure gives the idea of a rather thick shell, and the form of the mouth is incorrect, being too convex below and, consequently, too high in comparison with the breadth.

9. MACROCHLAMYS TENUICULA. Pl. II, Fig. 8.

Macrochlamys tenuicula, H. Ad., P. Z. S. 1868, p. 14, pl. iv, fig. 9.

Helix tenuicula, Pfr., Mon. Hel. vii. p. 94.—Hanley, Conch. Ind. pl. lxxxix, figs. 7, 10.

Macrochlamys effulgens, W. Bl., MSS.—Theobald, Cat. Land and Freshwater Shells of British India, p. 18.

Nanina (*Macrochlamys*) *effulgens*, Nevill, Hand-list Mollusca, Indian Museum, Calcutta, part i. p. 26.

Nanina (*Microcystis ?*) *tenuicula*, Nevill, ib. p. 36.

Testa aperte perforata, turbinata, tenuis, flavo- vel fulvo-cornea, lævigata, nitida, diaphana, oblique striatula, sub lente lineis impressis confertis minutis in anfractibus superioribus subtilissime decussata. Spira subconica, lateribus convexiusculis, apice obtuso, suturâ leviter impressâ. Anfr. 5½-6, *convexiusculi, regulariter crescentes, ultimus non descendens, ad peripheriam obsolete subangulatus, angulo omnino antice evanescente, sed in testis junioribus validiore, subtus convexus, radiatim striatulus. Apertura obliqua, ovato-lunaris, latior quam alta. Peristoma tenue, rectum, marginibus subconniventibus, columellari subverticali, breviter reflexo. Diam. maj.* 9, *min.* 8¼, *axis* 6 *mm.*

HAB. Ad Bombay et in terris vicinis, necnon in montibus 'Western Ghats' seu 'Syhadri' dictis.

Shell openly perforate, turbinate, thin, yellow or fulvous horny, smooth, polished, transparent, obliquely striated, and under the lens finely decussated on the upper whorls with minute, close, impressed spiral lines. Spire subconical, the sides a little convex, apex obtuse, suture slightly impressed. Whorls 5½-6, rather convex, regularly increasing, the last not descending, obsoletely subangulate at the periphery (in immature shells distinctly angulate), the angle disappearing near the mouth, convex below and radiately striated. Aperture oblique, ovately lunate, broader than high. Peristome thin, straight, the margins approaching each other slightly, columellar margin subvertical, reflected for a short distance. Major diameter 0·36, minor 0·33, axis 0·24 inch. The foot of the animal is very long and narrow, and there are the usual pointed shell-lobes to the mantle. The colour of the body is almost black.

The shell described by the late Mr. H. Adams as *Macrochlamys tenuicula* appears to me almost certainly to be the immature form of a species common in Bombay. This form I have had for many years; and I formerly distributed specimens under the MSS. name of *Helix effulgens*, a name which has unfortunately got into print. The adult shell has never been described; but the specimen figured in the 'Conchologia Indica' must have been nearly full-grown. Mr. Adams's original types were said to be from Sattara. It is probable they came from the Western Ghats in the Sattara district; but the species may extend to the damper portions of the Deccan plateau.

The figures herewith given are very unsatisfactory; the left-hand figure is quite inaccurate. This, however, is of less importance, as the shell is very fairly represented in the 'Conchologia Indica.'

10. MACROCHLAMYS? PLICIFERA.

Nanina plicatula, W. Bl., J. A. S. B., 1870, xxxix, pt. 2, p. 13, pl. iii, fig. 7. *nec N. plicatula*, Mart., Nachrichtsbl. mal. Gesellsch., 1869, i, p. 149.
Helix plicatula, Hanley, Conch. Ind., p. 14, pl. xxviii, fig. 1.
Macrochlamys plicatula, Theobald, Cat. Land and Freshwater Shells Brit. Ind. p. 19.
Nanina, n. sp., Nevill, Hand-list Moll. Ind. Mus. Calcutta, p. 27.

I am indebted to Mr. Nevill for calling attention to the fact that the name I gave to this shell was pre-occupied. I propose to change the specific title to *plicifera.*

11. MACROCHLAMYS? WYNNEI, sp. nov., Plate III, Fig. 5, 5*a*.

Testa perforata, subturbinato-depressa, striatula, nitida, albido-cornea, diaphana, fasciâ rufâ supra peripheriam circumdata. Spira depresso-conica, apice obtuso, suturâ leviter impressâ, fasciâ rufâ intus marginatâ. Anfr. 5½, *lente accrescentes, ultimus peripheriâ rotundatus, subtus modice convexus, aperturam versus vix descendens. Apertura late lunaris, obliqua, diagonalis; peristoma tenue, intus haud incrassatum, margine basali subrecto obtuso, columellari reflexo. Diam. maj.* 19, *min.* 17½, *axis* 9½ *mm.* (*ex icone*). *In exemplo minore diam. maj.* 13½, *min.* 12¼, *axis* 7½ *mm. apert.* 7 *lata*, 6 *oblique alta.*

HAB. Ad Mari (Murree) in montibus Himalayanis occidentalibus inferioribus haud procul a flumine Jhelum (*A. B. Wynne*).

Var. *major, depressa, anfractibus* 6, *spirâ convexâ, parum elevatâ : diam. maj.* 21½, *min.* 19½, *axis* 10 *mm., apert.* 11½ *lata,* 10 *oblique alta.*

Hab. Etiam ad Mari.

Shell perforate, subturbinately depressed, faintly striated, polished white, translucent, surrounded by a narrow rufous band above the periphery. Spire depressedly conical, apex obtuse, suture slightly impressed, and with a rufous margin inside. Whorls 5½, increasing slowly and regularly, the last rounded at the periphery, moderately convex beneath, scarcely descending towards the mouth. Aperture broadly lunate, oblique, diagonal; peristome thin, not thickened inside, basal margin almost straight, columellar reflected. Major diameter 0·76, minor 0·7, axis 0·37 inch (taken from the figure). A smaller specimen measures :—major diam. 0·54, minor 0·5, axis 0·3, breadth of aperture 0·27, height (obliquely measured) 0·23 inch.

There is a larger variety, more depressed, with the spire convex and six whorls. It may possibly be a distinguishable form, but I think not. A specimen measures :—major diameter 0·85, minor 0·78, axis 0·42, breadth of aperture 0·45, height (obliquely measured) 0·4.

I greatly question whether this form is really a *Macrochlamys*, and cannot help suggesting the possibility of its belonging to a different subgeneric group, or even to *Zonites*. However, it is associated at Mari with a true *Macrochlamys* (*M. prona**) and two or three species of *Helicarion ;* so it is evident that a few of these tropical types extend to this extreme north-western portion of the Himalayan range, where, however, the majority of the mollusca consist of *Bulimini* of the *Petræus* section.

The specimen of *M. wynnei* from which the accompanying figure was taken has been mislaid or lost, and the description is drawn up from a smaller individual. I have named the shell after Mr. A. B. Wynne of the Geological Survey of India, to whom I am indebted for several mollusca from the neighbourhood of Mari.

I have been in some doubt as to whether this might not be a form of the shell described by Prof. v. Martens as *Nanina jacquemonti* (Malak. Bl. xvi. 1869, p. 75 ; Pfr. Nov. Conch. iv. p. 48, pl. cxviii, figs. 6-8) ; but, in the first place, it can scarcely, I think, be the species figured by Jacquemont (Voyage dans l'Inde, Atlas, pl. xvi. fig. 2), and, secondly, *N. jacquemonti* is described as having "*peristoma obtusum, intus incrassatum, margine...basali leviter arcuato,*" none of which can apply to the present species. Pfeiffer's figure in the 'Novitates' shows a very much less oblique mouth than is found in *Macrochlamys? wynnei.* Now, I have another species from Mari, which agrees admirably with Marten's description in these respects, and which resembles Jacquemont's figure also, but it wants the red band round the periphery shown in Pfeiffer's figure. It is just possible that two species are included by Martens. The true *N. jacquemonti* is probably a *Bensonia*.

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* Nevill, 'Scientific Results of the Second Yarkand Mission,' Mollusca, p. 17.

12. PUPA (PUPISOMA) EVEZARDI.

"*Pupa* (*Pupisoma*) *evezardi*, Blanford," Nevill, Hand-list Moll. Ind. Mus. Calcutta, pt. i. p. 192.

? "*Pupa evezardi*, Blanford MS.," Hanley, Conch. Ind. p. 41. pl. ci, figs. 5, 6.—Theob. Cat. Land & Freshwater Shells Brit. Ind. p. 30.—Pfr. Mon. Hel. viii. p. 415.

Testa imperforata, vix subrimata, conoideo-ovata, tenuis, cornea, lineis elevatis irregularibus filiformibus obliquis ornata. Spira subtus subcylindracea, superne conoidea, lateribus convexis, apice obtuso, suturâ impressâ. Anfr. $4\frac{1}{2}$, *convexi, regulariter crescentes, ultimus parum major, peripheria atque basi rotundatus, haud antice descendens. Apertura diagonalis, truncato-rotunda, edentula ; peristoma tenue, rectum, expansiusculum, marginibus conniventibus, columellari verticali, ad basin subtorto, adnato-reflexo, regionem umbilicalem tegente. Long.* $2\frac{2}{3}$, *diam. fere* 2, *long. ap.* 1 *mm.*

HAB. In cortice arborum ad Khandalla inter Bombay et Poona (*G. Evezard*).

Shell imperforate, with scarcely even a trace of rimation in the umbilical region, conoidly ovate, thin, horny, with raised hair-like oblique lines, rather irregularly disposed, on all the whorls Spire nearly cylindrical below, conoidal above, the sides convex, apex blunt, suture impressed. Whorls $4\frac{1}{2}$, convex, increasing in size regularly ; the last but little larger than the penultimate, rounded at the periphery and below, not descending in front. Aperture diagonal, nearly circular, but truncated above, without teeth ; peristome thin, all in one plane, slightly expanded, margins converging ; columellar vertical above, slightly twisted below, reflected and united to the whorl so as completely to cover the umbilicus. Length 0·11, diameter 0·08, length of aperture 0·04 inch.

If the form represented by Hanley in the 'Conchologia Indica' be precisely the same as that described above, I am inclined to question the locality given, "Singhur," or, as Mr. Theobald prefers writing it, "Synghar," presumably Sinhgarh, near Poona. The original specimens were found by Colonel Evezard at Karkalla, near Khandalla, at the head of the Bor-ghat ; and I suspect that Hanley's figure was taken from one of them. There are two or three allied forms found in the Syhadri range and the Nilgiris, forms that do not appear hitherto to have been described.

The subgenus *Pupisoma* was proposed by Stoliczka* for the Moulmein

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* J. A. S. B., 1873, vol. xlii. pt. 2, p. 32.

P. lignicola,* a form very closely resembling *P. evezardi*, but rather shorter and less ovate. It is by no means improbable that intermediate varieties may be found; indeed, so much do I doubt whether the two are really worthy of distinction that I should not have described the present species if the name had not already crept into print.

Mr. Nevill, in his Hand-list *l. c.*, has referred the *Helix orcula* of Benson to the same section of *Pupa* as *P lignicola;* and in this he is, I think, unquestionably right.

13. SUCCINEA COLLINA.

"*S. collina*, Blanford, MS.," Hanley, Conch. Ind. p. 30, pl. lxviii. figs. 8, 9, 10; Theobald, Cat. Land and Freshwater Shells Brit. Ind. p. 31; Pfr., Mon. Hel. viii. p. 558; Nevill, Hand-list Moll. Ind. Mus. pt. i. p. 212.

Testa conico-ovata, tenuiuscula, parum nitida, distincte atque flexuose striata, viridescenti-cornea. Spira scalaris, apice acutiuscula, suturâ valde impressâ. Anfr. vix 3, perconvexi, ultimus ¾ longitudinis subæquans. Apertura ovata, obliqua; peristoma tenue, margine dextro mediocriter arcuato; columella arcuata, recedens, callosa. Long. 17, diam. 10, alt. (v. diam. min.) 6 mm., apertura 13 mm. longa, vix 9 lata.

HAB. Saxis rupibusque adhærens prope Mahabaleshwar ad summos montes 'Syhadri' seu 'Western Ghats' dictos Indiæ occidentalis.

Var. *aurantiaca v. rufo-cornea; habitat in colle 'Torna' dicto, inter Mahabaleshwar atque urbem Poona.*

Shell conically ovate, rather thin, but little polished, distinctly and flexuously striated, greenish horny in colour. Spire step-like, apex rather pointed, suture much impressed. Whorls scarcely 3, very convex, the last about ¾ of the length. Aperture oval, oblique; peristome thin, the right margin moderately curved forwards; the columella arcuate, receding, and covered with a thin callus. Length 0·76, diameter 0·4, height (when laid mouth downwards) 0·24 inch; length of aperture 0·52, breadth 0·36 inch. The largest shell I possess measures 20 mm. in length (0·8 inch). A rufous variety occurs at Torna Hill, near Sinhgarh, west of Poona.

This is a rock-inhabiting species,† found on cliffs and large blocks of basalt at Mahabaleshwar and Torna, and is allied to *S. girnarica*, a larger and thicker form, rather differently shaped, found by Mr. Theobald on the basaltic rocks of Girnar Hill, in Kattywar. The animal of *S. collina* bears a considerable external resemblance to that of the subgenus *Lithotis*, which has a similar habitat.

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* J. A. S. B., 1871, vol. xl. pt. 2, p. 171.

† It is rather difficult to understand why *Succinea* should be placed amongst freshwater shells in the 'Conchologia Indica.' Most of the Indian forms are found either on trees (often on palms) or on rocks, and generally at a distance from water. *Lithotis* and *Camptonyx* are also, I think, incorrectly classed as freshwater shells, both being found on basaltic cliffs.

The figures in the 'Conchologia Indica' give a fair idea of the species, but the spire in fig. 8 is rather too large.

14. STREPTAXIS COMPRESSUS, sp. nov., Plate II, Fig. 13.

"*S. compressus*, Wl. Bl.," Theobald, Cat. Land and Freshwater Shells Brit. Ind. p. 33.

Testa subaperte sed non pervie umbilicata, valde depresso-ovata, cereo-albida, diaphana, nitida, vix striatula. Spira vix convexa, fere plana, suturâ parum impressâ. Anfr. 4½, *penultimus postice compressus, obtuse sed prominenter carinatus ; ultimus valde eccentricus, antrorsum devians, subtus planulatus politusque, circa umbilicum, præsertim antice, angulato-coarctatus, pone aperturam fossiculis impressis constrictus. Apertura diagonalis, semiovalis, laminâ unâ validâ subbifidâ intrante parietali, dente uno duplici columellari, tribus palatalibus in margine dextro, coarctata. Peristoma incrassatum, undique sublate expansum, postice juxta angulum mediocriter sinuatum, marginibus callo lamellifero junctis. Diam. maj.* 6½, *min.* 3¾, *alt vix* 3 ; *ap. long.* 2⅓, *lat.* 2 *mm.*

HAB. In montibus 'Sivagiri' dictis (Tinnevelly) Indiæ meridionalis (*H. Beddome*).

Varietas anfractibus quinque, superne et in umbilico confertim filiformi-striata, laminâ parietali duplici, in montibus habitat prope urbem Cumbum. Exempli majoris diam. maj. 6½, *minoris* 5¼, *diam. min.* 4 *et* 3½, *alt.* 2¾ *et* 2½.

Shell rather openly but not perviously umbilicated, depressed, oval, yellowish white, translucent, glossy, scarcely striated. Spire almost flat, suture but little impressed. Whorls 4½, the penultimate compressed and prominently but bluntly keeled posteriorly ; the last very eccentric, flattened and smooth below, and angulately compressed around the umbilicus, and especially near the mouth, where there are indentations corresponding to the teeth inside. Aperture diagonal, semioval, and furnished with five teeth, one strong re-entering bifid plait on the parietal callus uniting the margins of the peristome, one large double tooth on the columellar side, three palatal teeth on the right side. Peristome thickened and expanded, curved back near the posterior angle. Major diam. 0·25, minor 0·15, height 0·11 inch.

A variety from the Cumbum hills has distinct but very fine close filiform raised lines on the upper surface and inside the umbilicus, and the parietal lamina is double. Some specimens are rather smaller than the type. It is doubtful whether these differences justify a separate name.

15. STREPTAXIS PERSONATUS, sp. nov., Plate II, Fig. 10.

"*S. personatus*, Wl. Bl.," Theobald, Cat. Land and Freshwater Shells Brit. Ind. p. 33.

Testa umbilicata, depressa, sphæroideo-ovata, lævigata, nitidula, diaphana, cereo-albida. Spira depressa, apice vix exserto, suturâ impressâ. Anfr. 5, *convexi, penultimus postice rotundatus, vix ultra ultimum (a basi spectatus) projiciens ; ultimus eccentricus, antrorsum devians, subtus convexus, circum umbilicum compressus, post aperturam fossiculis impressis constrictus. Apertura obliqua, fere semiovalis, laminâ unâ validâ flexuosâ intrante parietali, dentibusque* 5, *tribus in margine columellari, duobus in dextro, harum uno inferiore majore laminæ parietali opposito, alio minore superiore, coarctata. Peristoma incrassatum continuum, fere solutum, album, undique late expansum, postice juxta angulum subprofunde retrosinuatum, margine parietali valido, concavo. Diam. maj.* 5, *min* 3¾, *alt.* 2½.

HAB. In montibus haud procul ab urbe Cumbum (Madura) Indiæ meridionalis (*H. Beddome*).

N. B. *In nonnullis exemplis peristoma quadri-vel tridentatum nec quinquedentatum est, dente uno columellari et aliquando uno palatali carens.*

Shell umbilicated, depressed, spheroidally ovate, smooth, moderately polished, translucent, pale yellowish white. Spire depressed, the apex scarcely exserted, suture impressed. Whorls 5, convex, the penultimate rounded behind, scarcely projecting beyond the last when seen from below ; the last eccentric, convex below, compressed around the umbilicus, and constricted by pits corresponding to the teeth inside, just behind the mouth. Aperture oblique, irregularly semioval, and furnished with one strong re-entering parietal lamina, curved inside, and with five teeth, three on the columellar margin, two on the right ; of the latter the lower is larger and opposite to the parietal lamina, the smaller is above, nearer to the angle. Peristome thickened, continuous, almost free (the thick callus which unites the columellar and dextral margins projecting from the last whorl, in a hollow curve, the concavity corresponding to the parietal lamina) ; the outer margins expanded, the right margin deeply recurved close to the posterior angle. Major diameter 0·2, minor 0·15, height 0·1 inch.

In other specimens, rather worn, and with the peristome somewhat less developed, the teeth are rather smaller, the upper columellar tooth is wanting, and in one case the upper tooth on the right margin is also deficient. All, however, are characterized by the great development of the parietal callus.

16. STREPTAXIS CONCINNUS, sp. nov., Plate II, Fig. 11.

Testa umbilicata, depressa, globoso-ovata, striatula, nitidula, diaphana, cereo-albida. Spira depresso-conica, parum exserta, apice obtusiusculo, suturâ impressâ. Anfr. 5, convexi, penultimus postice rotundatus, haud ultra ultimum (a basi spectatus) projiciens ; ultimus inflatus, multo major, eccentricus, antrorsum devians, subtus convexus, lævigatus, politus, circum umbilicum praesertim antice compressus, post aperturam fossiculis impressis constrictus. Apertura obliqua, fere semiovalis, lamellis duobus intrantibus parietalibus, sinistrâ longiore, intus tortâ, dentibusque 5, duobus columellaribus, superiore minore juxta umbilicum, inferiore magno duplici, uno basali lamelliformi transverso, duobusque in margine dextro, inferiore subbifido, superiore minore, coarctata. Peristoma album expansum, ad angulum postice vix sinuatum, marginibus callo duas lamellas ferente junctis. Diam. maj. 5¾, min. 4, alt. 3¼ mm.

HAB. In montibus 'Balarangam' dictis (Mysore) Indiæ meridionalis (*H. Beddome*).

Shell umbilicated, depressed, globosely ovate, rather indistinctly striated, shining, translucent, pale yellowish white. Spire very low, scarcely exserted, apex blunt, suture impressed. Whorls 5, convex, the penultimate rounded behind, and not projecting, when viewed from below, beyond the lower whorl ; the last whorl much larger than the others, eccentric, convex below, smooth and polished, compressed around the umbilicus, especially near the mouth, and constricted by indentations, corresponding to the teeth inside, just behind the lip. Aperture oblique, nearly semioval, and furnished with two plaits on the parietal side, that to the left (nearest to the umbilicus) longer than the other and bent inside ; there are five teeth in the peristome, one on the columellar margin near the umbilicus, a second large and double nearer the base, one lamellar and transverse at the base, two inside the right margin, the lower being larger than the other and almost bifid inside. Peristome white, slightly expanded, scarcely sinuate near the angle, margins joined by a callus bearing the two parietal plaits. Major diameter 0·23, minor 0·2, height 0·13 inch.

This is the only known species from Southern India, so far as I am aware, in which, when the shell is viewed from below in the direction of the axis, the penultimate whorl does not project at all beyond the body-whorl. The transverse lamellar tooth at the base of the aperture is also peculiar.

17. STREPTAXIS PRONUS, sp. nov., Plate II, Fig. 12.

Testa umbilicata, depresso-ovata, superne confertim atque arcuatim costulato-striata, nitidula, diaphana, cereo-allida. Spira depresso-conica, parum exserta, apice obtuso, suturâ parum impressâ. Anfr. 5½, *superiores convexiusculi, penultimus postice rotundatus, longe ultra ultimum (a basi spectatus) projiciens; ultimus valde eccentricus, antrorsum devians, subtus subplanulatus, lævigatus, in umbilico striis filiformibus flexuosis ornatus, circum umbilicum compressus atque aperturam versus angulatus, juxta peristoma scrobiculis constrictus. Apertura obliqua, truncato-ovalis, lamellâ validâ parietali intrante flexuosâ, antice subbifidâ, dentibusque quatuor, uno columellari, alio basali, duobus in margine dextro, coarctata. Peristoma incrassatum, subcontinuum, album, expansum, marginibus callo crasso lamellifero junctis, dextro prope angulum sinuatum. Diam. maj.* 6½, *min.* 4, *alt.* 3 *mm.*

HAB. In montibus haud procul ab urbe Tinnevelly Indiæ meridionalis (*H. Beddome*).

Shell umbilicated, depressedly ovate, closely and arcuately ornamented above with subcostulate striation, polished, translucent, pale yellowish white. Spire low, conical, but little exserted, apex obtuse, suture but little impressed. Whorls 5½, the upper slightly convex, the penultimate rounded behind and projecting considerably beyond the lower whorl when viewed from below; last whorl very eccentric, somewhat flattened beneath, smooth, except within the umbilicus, where there are fine, irregularly flexuous filiform raised lines on the surface, compressed around the umbilicus and angulate near the aperture, where there are deep indentations corresponding to the teeth inside. Aperture oblique, truncately oval, furnished with a strong re-entering parietal plait, curved within and subbifid in front, and with four teeth—one columellar, one basal, and two (of which the upper is small) inside the right margin. Peristome thickened, subcontinuous, white, expanded, the margins joined by a thick callus projecting from the body-whorl and bearing the parietal lamella. Major diameter 0·26, minor 0·16, height 0·12 inch.

This shell resembles *S. compressus* in form, but it wants the angulation of the penultimate whorl. The peristome is much thickened, as in *S. personatus.*

The forms of *Ennea* and *Streptaxis* described in this paper are the principal that have been collected in the Southern Indian mountains by Colonel Beddome, from whom I have received specimens from various localities from time to time. All of the species of *Streptaxis* are somewhat variable, and, with a large collection from South India, it would probably be found that many intermediate varieties occur. As a rule, the general form appears more constant than any other characters, and the teeth in the mouth vary considerably. The parietal lamellæ are peculiarly inconstant. Thus, the original type of *Streptaxis perrotteti*, the common species on the top of the Nilgiri hills, has two lamellæ*; but I have a variety from Ootacamund in which the smaller of the two, that nearer to the angle of the mouth, is obsolete, and in other specimens from the same locality there is but a rudimentary representation of this plait. It was the form with a single lamella which was compared with *S. watsoni* when the latter was originally described (J. A. S. B., 1860, xxix, p. 127). The variation in the teeth of *Streptaxis* has already been noticed in these contributions J. A. S. B., 1861, xxx, p. 359.

The genus *Streptaxis* is abundantly represented on the various hill-groups of Southern India, especially on the higher elevations of the Syhádri, or Western-Ghat range. The most northern locality from which I possess a specimen is the hill-fort of Torna, near Sinhgarh, west of Poona, in the Bombay Presidency. The shell in question is weathered, and not in very good condition; it is a large form (that is, large compared to the minute species described in the preceding pages), measuring $11\frac{1}{2}$ mm. by $8\frac{1}{2}$, and it is nearly allied to the Nilgiri *S. perrotteti*, and perhaps still more nearly to the Ceylon *S. cingalensis*.

18. ENNEA MACRODON, sp. nov., Plate II, Fig. 15.

Testa flexuose rimata, subcylindrico-turrita, diaphana, nitidula, confertim capillaceo-costulata, cereo-albida. Spira elongata, sursum parum attenuata, lateribus subrectis, apice obtuso, suturâ impressâ. Anfr. 7, *convexi, duo superiores lævigati: ultimus aperturam versus subascendens. Apertura verticalis, oblique semiovalis, lamellâ validâ bicruri intrante parietali, aliâ columellari profundâ, dentibusque tribus, uno tuberculiformi columellari, alio magno lamelliformi transverso basali latus dextrum versus, tertio minore in margine dextro, coarctata. Peristoma album, expansum, juxta anfractum penultimum sinuatum, marginibus callo lamellifero junctis. Long.* 5, *diam. vix* 2, *ap. long.* $1\frac{1}{4}$ *mm.*

HAB. Apud Pykara in summos montes 'Nilgiri' dictos Indiæ meridionalis.

Shell flexuously rimate, subcylindrically turreted, translucent, polished, yellowish white, closely sculptured, except on the apical whorls, with fine hair-like vertical costulation. Spire turreted, elongate, diminishing very slowly in thickness upwards, the sides nearly straight, the apex blunt and rounded, the suture impressed. Whorls 7, convex, the first two smooth, the last ascending very slightly near the aperture. Aperture vertical, semioval, obliquely truncated above, and very much contracted by teeth, consisting of a strong re-entering bifid parietal[*] plait on the callus connecting the margins of the peristome, an internal re-entering columellar lamina, commencing at a distance within the mouth, and three teeth—one, more or less tubercular, on the left or columellar side, a second tubercular tooth on the right margin, opposite the parietal plait, and with it nearly cutting off the posterior corner of the aperture, and a third, broad, lamelliform, and transverse (parallel to the plane of the mouth) on the right side of the basal margin. Peristome white, expanded throughout, curved a little back near the angle, where it meets the penultimate whorl, the margins united by a callus bearing the parietal lamella. Length 0·21, diameter 0·075, length of aperture 0·05 inch.

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* Petit, quoted by Pfeiffer, Mon. Hel. i. p. 9.

I obtained several specimens of this shell near Pykara, on the Nilgiri hills of Southern India, in 1858, and for a long time supposed it to be *E. pirriei* of Pfeiffer,[†] but I noticed it as a distinct form when describing *E. sculpta* (J. A. S. B., 1869, xxxviii, pt. 2, p. 141), and mentioned some of its peculiarities. *E. macrodon* is distinguished not only from *E pirriei*, but also from all other Indian species of the genus, by its strong basal transverse lamelliform tooth. This character serves to distinguish the two species at all ages; for in the present species, as in *E. sculpta*, *E. pirriei*, and, doubtless, in the two forms (*E. exilis* and *E. subcostulata*) described below, the apertural teeth, and especially the parietal lamella, are well developed in immature shells even before all the whorls are completed. *E. macrodon*, too, is only half the size of *E. pirriei*, and there appear to be several slight differences in form, sculpture, and dentition.

19. ENNEA SUBCOSTULATA, sp. nov., Plate II, Fig. 14 (*upper*).

Testa arcuato-rimata, subcylindrico-turrita, diaphana, nitida, cereo-albida, confertim subobsolete costulata. Spira parum attenuata, lateribus convexiusculis, apice obtuso, suturâ impressâ. Anfr. 7½, *convexiusculi, ultimus antice breviter ascendens. Apertura verticalis, oblique semiovalis, lamellâ validâ intrante bicruri, flexuosâ, parietali juxta angulum, aliâ profundâ columellari, et quatuor dentibus, uno columellari, duobus basalibus, quarto dextrali plicæ parietali opposito, coarctata. Peristoma expansum, albidum, juxta anfractum penultimum sinuatum, marginibus callo lamellifero junctis. Long. diam.* 2, *ap. long.* 1¼ *mm.*

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[*] For the meaning of the terms palatal, parietal, and columellar, applied to teeth within the mouth, see Pfeiffer, Mon. Hel. ii, p. 300, note.

[†] It was quoted as that shell, J. A. S. B., 1860, xxix, p. 126, and 1861, xxx, p. 364.

Hab. In montibus 'Shevrai' vel 'Shevroy' dictis, haud procul ab urbe Salem, Indiæ meridionalis (*H. Beddome*).

Shell arcuately rimate, subcylindrically turreted, translucent yellowish, white, finely and somewhat indistinctly ribbed. Spire turreted, elongate, becoming rather smaller above, with the sides rather convex, the apex blunt, and the suture impressed. Whorls 7½, moderately convex; the last whorl ascending slightly close to the mouth. Aperture vertical, semioval, obliquely truncated, with a strong re-entering parietal plait, bifid and flexuous within, near the posterior angle, a columellar lamina at a distance within the mouth, and four tubercular teeth—one columellar, two basal, and the fourth inside the right margin opposite to the parietal plait, so as partly to cut off the upper (posterior) portion of the mouth. Peristome white, expanded, except near the junction with the last whorl, where the edge is curved back somewhat; margins united by a callus, on which is the parietal plait. Length 0·22, diam. 0·075, length of aperture (including peristome) ·05 inch.

I have received from Col. Beddome three specimens of this species, two of which are evidently immature; the third I believe to be full-grown, but the peristome may perhaps be more fully expanded in older examples.

E. subcostulata is allied to *E. pirriei*, *E. sculpta*, *E. macrodon*, and their allies, but is distinguished from all by sculpture and the form of the teeth in the mouth. It was, I believe, this species which was erroneously quoted as *E. pirriei* from the Shevroy hills (J A. S. B., 1861, xxx. p. 364).

20. ENNEA EXILIS, sp. nov., Plate II, Fig. 14 (*lower*).

Testa rimata, subcylindrico-turrita, diaphana, lævigata, nitidula, albido-cerea. Spira elongata, sursum vix attenuata, lateribus apicem versus convexis, apice obtuso, suturâ parum impressâ. Anfr. 6½-7, *convexiusculi, ultimus antice subascendens. Apertura fere verticalis, oblique semiovalis, lamellâ validâ intrante bicruri parietali, aliâ profundâ columellari spirali, dentibusque quatuor, uno columellari, duobus basalibus quasijunctis, quartoque minore in margine dextro, coarctata. Peristoma expansum, albidum, postice juxta angulum sinuatum, marginibus callo lamellifero junctis. Long.* 4½, *diam.* 1½, *ap. long.* 1 *mm.*

Hab. In montibus 'Balarangam' dictis provinciæ Mysore in India meridionali (*H. Beddome*).

Shell rimate, subcylindrically turreted, translucent, smooth, polished, yellowish white. Spire turreted, elongate, diminishing very slowly indeed below, but more rapidly above, where the sides are convex, apex blunt, suture slightly impressed. Whorls 6½-7, slightly convex, the last whorl ascending very little near the mouth. Aperture nearly vertical, semioval, obliquely truncated, with a strong re-entering bifid palatal plait on the callus uniting the margins of the peristome, a spiral columellar lamina commencing at a distance within the mouth, and four tubercular teeth just inside the peristome*—one columellar, two joined together at their base, at the lowest part of the aperture, and one, very small, inside the right margin and opposite to the large parietal plait. Peristome white, slightly expanded, except near the junction with the last whorl, where the margin is slightly curved back. Length 0·18, diameter 0·06, length of aperture 0·04 inch.

This form, of which I have received four specimens from Col. Beddome, is distinguished from its allies by being quite smooth. As in the case of some of the allied forms, it is not improbable that in old specimens the peristome may be more broadly expanded and the palatal teeth may become more or less obsolete.

21. ENNEA STENOSTOMA, Bedd. MS., Plate II, Fig. 17.

Testa longe profundeque rimata, pupiformis, cylindraceo-ovata, solidula, lævigata (forsan aliquando oblique striata), impolita, haud nitida, albida. Spira subcylindrica, lateribus convexiusculis, apice rotundato, obtuso, suturâ impressâ. Anfr. 6½, *convexi, quatuor penultimi subæquales ; ultimus post aperturam valde compressus, haud ascendens, capillaceo-striatus, lateribus ambobus juxta peristoma scrobiculis impressis constrictus. Apertura verticalis, subaxialis, non lateralis, suboblonga, altior quam lata, marginibus lateralibus concaviusculis, basali convexo, dentibus valde coarctata, plicâ unâ validâ simplici intrante parietali juxta angulum, tuberculis duobus columellaribus, uno superiore profundo, alio majore inferiore in peristomate, duobus minoribus basalibus, uno dextrali, alio sinistrali, uno denique majore bifido in margine dextro, plicæ parietali opposito sed inferiore, munita. Peristoma album, reflexum, postice sinuatum, marginibus callo lamellifero junctis. Long.* 3½, *diam.* 1½, *ap. long.* 1¼ *mm.*

HAB. In montibus 'Golconda' dictis, haud procul ab urbe Vizagapatam (*H. Beddome*).

Var. *minor, anfractibus* 5½ ; long. 3, diam. 1½, ap. long. 1½ mm. (Pl. II, Fig. 16.)

HAB. In montibus haud procul ab urbe Karnul (Kurnool) Indiæ meridionalis, (*H. Beddome*).

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* None of the teeth are well represented in the figure.

Shell with a long deep groove at the base, pupiform or cylindrically ovate, rather thick, smooth (perhaps sometimes obliquely striated), dull, destitute of polish, whitish. Spire subcylindrical, with the sides slightly convex, the apex blunt and rounded, and the suture impressed. Whorls 6½, convex, the four behind the last whorl subequal, the penultimate being scarcely smaller; the last strongly compressed behind the aperture, with raised hair-like lines of sculpture, not ascending, deeply indented on both sides. Aperture* vertical, nearly in the axis of the shell, not lateral, nearly oblong in shape, higher than broad, both the right and left margins slightly concave, lower margin convex. Teeth in the mouth numerous, and consisting of the simple† strong re-entering parietal fold near the posterior angle, two columellar tubercles (the upper and smaller situated at some depth inside the mouth, the smaller and larger in front close to the lip), two small basal teeth right and left of the lowest portion of the mouth, and one large bifid tooth on the right margin nearly opposite to the parietal fold, but not very close to it, and rather inferior to it in position. Peristome white, expanded throughout, curved back near the posterior angle, the margins united by a thick callus, on which the parietal lamina is situated. Length 0·14, diameter 0·06, length of aperture 0·05 inch.

The typical form was obtained in the Golconda hills near Vizagapatam, and the single specimen sent to me by Col. Beddome, from which the accompanying figure was taken, was broken after being drawn. The description is from a specimen in the British Museum.

A smaller variety with 5½ whorls, and measuring 0·12 inch in length, 0·06 in diameter, and 0·37 in length of aperture, was procured by the same naturalist in the hills near Kurnool.

I have received three specimens of this variety from Colonel Beddome, and there are others in the British Museum. All have the same dull weathered appearance, though they look fairly fresh; but on one there appear what may be traces of sculpture, apparently striæ similar to the fine raised lines occurring on the last whorl near the aperture in all.

I am not acquainted with any species of *Ennea* nearly allied to this species. In form, the Sikkim and Khasi *E. stenopylis* shows some resemblance; but that shell is strongly costulate, and its curious aperture, with the posterior portion almost cut off and forming a semi-detached tube, shows the species to be merely an ovate form of the Himalayan and Burmese group, comprising *E. vara*, *E. blanfordiana*, and *E. cylindrelloidea.*

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* It is too broad in figure 17, and the shape is incorrect. The teeth, however, are nearly correct.

† Erroneously represented as double in fig. 17 on the accompanying plate.

22. ENNEA BEDDOMEI, sp. nov.

Testa rimata, subcylindraceo-turrita, cereo-albida, nitida, confertim verticaliter costulata, costulis in anfractu ultimo plus minusve obsoletis. Spira elongata, sursum attenuata, apice obtuso, suturâ impressâ. Anfr. 6, *convexi, ultimus antice ad aperturam vix ascendens. Apertura fere verticalis, semielliptica, lamellis duobus validis parietalibus, unâ anteriore dextrali intrante intus tortâ, aliâ profundâ sinistrali subcolumellari incurvâ, dentibusque lamelliformibus minoribus duobus vel tribus profundis palatalibus coarctata. Peristoma albidum, expansum, postice juxta angulum leviter sinuatum, marginibus callo lamellifero junctis. Long.* $3\frac{2}{3}$, *diam.* $1\frac{1}{3}$, *ap. long.* $\frac{2}{3}$ *mm.*

HAB. In montibus 'Sivagiri' dictis (Tinnevelley) Indiæ meridionalis (*H. Beddome*).

Shell rimate, subcylindrically turreted, pale yellowish white, polished, with close vertical ribbing on all the whorls, the ribs being more or less flattened and obsolete on the last. Spire elongate, becoming more slender above, apex blunt, suture impressed. Whorls 6, convex, the last scarcely ascending in front at the mouth. Aperture nearly vertical, semi-elliptical, with two strong re-entering parietal lamellæ—one of them in front to the right near the angle of the mouth, slightly twisted inside, the other to the left near the columellar margin, commencing at a distance within the mouth, and curved; there are also two or three small depressed lamelliform palatal teeth; but they are seen with difficulty from the front. Peristome white, expanded, the margins united by a callus bearing the parietal folds, the right margin curved back near the angle. Length 0·15, diam. 0·05, length of aperture 0·025 inch.

I have named this shell after the discoverer instead of adopting the term he had given to it in MS., as the latter might be objected to and changed. I have no specimen myself at present, but there are four in the British Museum. The form is peculiarly distinguished by the absence of any teeth in the peristome itself, although there are two or three at a little distance inside the aperture, and two folds on the callus joining the margins of the lip. In general form there is some resemblance to *E. exilis.*

23. ENNEA CANARICA, Beddome, MS.

Testa rimata, turrita, albida, solidula, confertim verticaliter costata. Spira subregulariter attenuata, apice obtuso, suturâ profundiusculâ. Anfr. $5\frac{1}{2}$, *convexi, infra saturam inflati, gradatim crescentes, ultimus antice vix ascendens. Apertura subrotunda, superne truncata, lamellâ validâ parietali intrante subtortâ, partem posteriorem aperturae fere discernente, aliâque*

columellari profundâ, vix in fauce conspicuâ, coarctata; dentibus palatalibus in peristomate nullis. Peristoma continuum, longe adnatum, album, incrassato-patens, undique expansum, intus granulatum, margine columellari angulatim incisum, basali lato, dextrali intus juxta lamellam parietalem breviter projiciente, angulum versus leviter retro-sinuatum. Long. 3¾, *diam.* 2, *ap. intus* ⅔ *mm. alta.*

HAB. In provincia 'South Canara' ad latus occidentale Indiæ meridionalis (*H. Beddome*).

Shell rimate, turreted, white (fresher specimens are probably yellowish white and polished), all the whorls ornamented with close vertical ribs. Spire almost regularly attenuate, apex blunt, suture rather deep. Whorls 6½, convex, swollen, and projecting beneath the suture, increasing in size by degrees, the last not ascending near the mouth. Aperture nearly round, except above, with one strongly developed parietal lamella, commencing in the front and re-entering deeply, a little twisted within, and so large as almost to cut off the upper left or posterior portion of the aperture; another smaller, deep-seated columellar fold is scarcely discernible from the mouth; no palatal teeth. Peristome continuous, attached for a considerable distance to the last whorl, white, thickened, broadly expanded, granulate inside; the columellar margin with an angular incision, the basal margin broader than the others, right margin curved back near the angle, and having a blunt projecting tooth-like process inside, opposite the parietal fold. Length 0·15, diameter 0·08, length of aperture within 0.025 inch.

The above description is taken from the only specimen I have ever seen, which is in the British Museum. The shell is remarkable for its peculiarly shaped whorls, each of which is suddenly swollen below the suture, so as to give almost a step-like appearance to the spire. The rounded mouth, too, with the broadly expanded peristome is quite different from that of any other Indian form of the genus. Perhaps the Khasi-Hill *Ennea vara* is as closely connected as any of the South-Indian forms, though there is but little resemblance between it and the present species, except such as is due to both being strongly ribbed, and to the manner in which the posterior or upper right-hand corner of the mouth is almost isolated by the strong parietal lamella and a projection from the inner margin of the peristome.

24. HELIX CALPIS.

Bens., Ann. & Mag. Nat. Hist. ser. 3, vol. iii, p. 268.—Pfr., Mon. Hel. v. p. 64.—Hanley, Conch. Ind. pl. xvi. fig. 8.

Macrochlamys calpis, Theobald, Cat. Land Freshwater Shells Brit. Ind. p. 19.

? *Nanina (Microcystis) calpis*, Nevill, Hand-list Moll. Ind. Mus. pt. i. p. 38.

This species was described from specimens collected by myself in 1856. I had but an imperfect knowledge of land mollusks at the time, or I should, I think, have seen at once, as I did some years afterwards, when re-examining my collections, that the shells were all young specimens of *Raphaulus (Streptaulus) blanfordi.* I had altogether a considerable number of specimens of the supposed *Helix calpis;* of these four were sent to England, and were examined by Mr. Benson; and it is manifest, from his description, that there was no difference between his examples and mine. In some of the latter I found the operculum still remaining.

In Mr. Nevill's Hand-list of Mollusca in the Indian Museum, Calcutta (*l. c.*), specimens of *Nanina calpis* from the Nága and Khási hills are included. *Streptaulus blanfordi* has been found in Sikkim, and in the Dafla hills, east of Bhutan; and I learn from Col. Godwin-Austen that he obtained a specimen from Brahmakúnd at the head of the Assam valley; but, as no example of the shell is known to have been found in the hill-ranges south of Assam, I think the specimens in the Indian Museum must be something different from the form described as *Helix calpis* by Mr. Benson.

25. SPIRACULUM TRAVANCORICUM, Beddome, MS., Plate III, Fig. 6.

Testa late umbilicata, depresso-turbinata, in exemplo vetusto adhuc detecto lævis, albescens (junior forsan epidermide induta, colorataque). Spira elevata, depresso-conica, suturâ profundâ, apice acuto. Anfr. 4½, *rotundati, ultimus cylindraceus, aperturam versus descendens atque breviter solutus,* 3 *mill. pone aperturam tubulo longiusculo antrorsum directo, anfractum penultimum tangente, munitus. Apertura diagonalis, circularis; peristoma duplex, internum breviter porrectum, superne sinistrorsum leviter sinuatum, externum expansum, atque, nisi ad marginem sinistrum, undulatum. Operculum extus fere planum, marginibus anfractuum exteriorum liberis, intus concavum. Diam. maj.* 12½, *min.* 10½, *axis* 7, *diam. apert.* 5½ *mill.*

HAB. In montibus Travancoricis haud procul a Tinnevelly (*H. Beddome*).

Shell broadly umbilicate, depressedly turbinate, and, in the single aged specimen found, decorticated, whitish and smooth throughout. Traces of a brown epidermis remain around the umbilicus, and younger specimens are probably brown in colour, and perhaps ornamented with coloured bands, like other species of the genus. Spire raised, depressedly conical, suture deep, apex acute.. Whorls 4½, rounded; the last cylindrical, descending, and free near the aperture, and provided above, about three millimetres behind the mouth, with a rather elongate tube, which projects forward, and is in contact with the penultimate whorl throughout. The tube appears broken at the end, and may have been even longer originally; the anterior termination in the specimen is in a line with the oblique peristome of the shell. Aperture diagonal, circular; peristome double, inner lip sharp, not projecting much, curved backwards near the penultimate whorl; outer peristome expanded, and wavy above externally and below, straight and somewhat narrower on the left margin. Operculum nearly flat externally, concave within; the outer margins of the whorls free and lamellar, except towards the middle; the circumference surrounded by several fine raised lines, the edges of the outermost whorls. Major diameter 0·5 inch, minor 0·42, axis 0·3, diameter of the mouth 0·23.

This species differs from all others of the genus by its higher spire, and by the combination of the mouth being free and the sutural tube being directed forwards and attached to the last whorl. The solitary specimen obtained was procured at a considerable elevation, 4000 or 5000 feet, in the hills between Travancore and Tinnevelly, not far from Cape Comorin.

26. CATAULUS COSTULATUS, sp. nov., Plate III, Fig. 7.

Testa subperforata, subovato-turrita, solida, subsinuate costulata, pallide straminea. Spira convexo-turrita, apice obtusiusculo, suturâ valde impressa. Anfr. 7½, *convexi, ultimus arctius convolutus, antice porrectus fere solutus, carinâ basali validâ, compressâ, costulatâ, antice dilatatâ munitus; periomphalo mediocri, costulato. Apertura subcircularis, fere verticalis, canali ad latus sinistrum marginis basalis patente, ore subobliquo, subtus spectante. Peristoma album, incrassato-expansum, revolutum, postice dextrorsum atque antice sinistrorsum ad canalem basalem productum, margine columellari angustiore, cum anfractu penultimo breviter juncto. Long.* 16, *diam. (perist. incl.)* 5, *diam. min.* 5½, *apert. intus* 3 *mm.*

HAB. In montibus 'Tinnevelly Ghats' dictis Indiæ meridionalis, (*H. Beddome*).

Shell subperforate, subovately turreted, solid, rather coarsely and subsinuately costulated, of a pale straw-colour. Spire turreted, with convex sides, apex rather obtuse, sutures well impressed. Whorls 7½, convex, the last more closely wound than the penultimate, to which it is scarcely attached just behind the mouth; the basal keel compressed, costulate, dilated in front; the space inside the keel and around the umbilicus is of moderate size and ribbed. Aperture nearly circular and subvertical, with the opening of the basal canal on the left side of the base, and not quite in the same plane as the aperture, but turned rather downwards. Peristome white, thickened, expanded, and turned back, produced above to the right of the penultimate whorl and below around the canal, narrow on the columellar margin, and only united for a short distance with the penultimate whorl. Length 0·65 inch, breadth (including the peristome) 0·25, minor diameter from front to back 0·23, width of aperture inside 0·13.

This species of *Cataulus*, the third hitherto obtained from the hills of Southern India, is distinguished from all other known forms of the genus by its comparatively coarse ribbing across the whorls. In other respects, it closely approaches *C. calcadensis*, Bedd. (J. A. S. B , 1869, xxxviii. pt. 2, p. 137, pl. xvi. fig. 8), having a similarly shaped spire, aperture, and basal channel. I have only seen one specimen of *C. costulatus* ; this differs from *C. calcadensis* not only in having stronger sculpture, but also in being rather shorter and in having one whorl less in the spire. The colour of *C. costulatus* also is paler than that of the Calcad shell, and the lip of the aperture is white.

Like the other Southern-Indian forms, *C. calcadensis*, *C. recurvatus*, and the species hereafter described, *C. costulatus* has the canal a little to the left of the lowest portion of the aperture, or nearer to the umbilicus than to the outer margin. In most Ceylonese species of the genus, the canal is nearly at the lowest portion of the mouth.* I find that in *C. tortuosus* the position of the canal is precisely as in *C. calcadensis* and *C. costulatus* (in *C. recurvatus*, the sinistral position of the canal is much more marked).

27. CATAULUS ALBESCENS, sp. nov.

Testa subperforata, subovato-turrita, tenuiuscula, albido-cornea, subsinuate costulato-striata. Spira turrita, lateribus convexis, apice obtusiusculo, suturâ valde impressâ. Anfr. 7, convexi, ultimus arctius convolutus, antice porrectus, fere solutus, vix descendens, carinâ basali transversim striatâ, postice obsoletâ, antice validâ, juxta aperturam dilatatâ munitus ; periomphalo mediocri, plicato-striato. Apertura subcircularis, fere verticalis, canali ad latus sinistrum marginis basalis patente, ore antice spectante. Peristoma album, incrassato-reflexum, postice et ad canalem basalem productum, margine columellari angustiore, cum anfractu penultimo breviter junctum. Long. 13, *diam. maj.* 5½, *min.* 4½, *apert. diam. intus vix* 3 *mm.*

HAB. In montibus Travancoricis haud procul ab urbe Trevandrum.

Shell subperforate, subovately turreted, rather thin, whitish horny, rather sinuately and costulately striated. Spire turreted, with the sides convex, apex obtuse, suture much impressed. Whorls 7, convex, the last more closely wound than the penultimate, to which it is but slightly attached just behind the mouth. Basal keel transversely striated, subobsolete on the body-whorl near the junction of the peristome, becoming stronger in front and dilated near the mouth; the space inside the keel and around the umbilicus is of moderate size and plicately striated. Aperture nearly circular and subvertical, with the opening of the basal canal to the left of the base, and in nearly the same plane as the aperture. Peristome white, thickened, expanded and turned back, produced slightly above to the right of the penultimate whorl, and to a greater extent below at the mouth of the canal; columellar margin a little narrower, joined for a short distance only to the penultimate whorl. Length 0·53, major diameter 0·22, minor 0·18; breadth of the aperture within 0·12 inch.

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* It is slightly to the left in *C. pyramidatus*, *C. eurytrema*, and *C. austenianus* ; basal in the smaller forms, like *C. templemanni* and *C. layardi*.

This is the smallest form yet obtained of the peculiar group of Southern-Indian *Catauli.* I received three specimens some years ago from Mr. Theobald, who supposed them to be *C. calcadensis.* Mr. Theobald, I believe, procured them from Mr. F. W. Bourdillon, who obtained them near Mynall, on the hills east of Trevandrum. This shell is, I think, mentioned as *Cataulus calcadensis* by Mr. Theobald in his description of Mr. Bourdillon's shells (J. A. S. B., 1876, xlv. p. 185). The present species, however, has one whorl less, and is a much smaller shell, with proportionately shorter whorls, the sculpture is less close and distinct, the colour whitish instead of golden brown, the basal keel less developed, and its opening is in the same plane as the aperture, instead of being turned downwards, &c. From *C. costulatus*, the present form is chiefly distinguished by its much finer sculpture and by the characters of the basal keel.

28. CATAULUS CALCADENSIS.

The original specimens of this species described by me in 1869 (J. A. S. B., xxxviii. pt. 2, p. 137) were bleached and chalky. Subsequently, Col. Beddome, who discovered and named this very interesting form of *Cataulus*, procured fresh living specimens of a golden-brown colour, with the aperture of the same tint as the shell.* The peristome in these specimens is not free from the last whorl. The operculum is normal, and precisely similar to that of Ceylonese species of the genus.

The specimens described by Mr. Theobald as *Hapalus travankoricus*† are, I am satisfied, immature shells, and I believe them to be the young of this, of *C. albescens*, or of some nearly allied species of *Cataulus.* Mr. Theobald states that the types of his supposed *Hapalus* differ from the young of *Cataulus calcadensis, i. e., C. albescens*, but he omits to point out the distinction. I had an opportunity of examining the types, which were shown to me by Mr. Theobald, and I told him my views on the subject, but he did not agree with me.

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* I have not seen specimens of the olive colour represented in the 'Conchologia Indica,' pl. cvi, fig. 10.

† J. A. S. B. 1876, xlv. pt. 2, p. 186, pl. xiv. fig. 5. The name should, in any case, be Latinized as *travancoricus.* There is no such place as Travankor, the common English name Travancore being a corruption of the real name.

I have recently examined the specimen of *C. tortuosus* (two in number) at the British Museum, and find the views I expressed several years since (J. A. S. B., 1869, xxxviii. pt. 2, p. 138) as to its alliance to *C. calcadensis* fully confirmed. In form, *C. tortuosus, C. calcadensis, C. costulatus,* and *C. albescens* are closely allied, all being much more ovate than any of the other species of the genus. The sculpture on *C. tortuosus* is much finer than on *C. calcadensis*, or even than on *C. albescens.* The discovery of two additional forms of this section of the genus in the hills of Southern India, and the absence of the genus from the collections hitherto made in the Nicobar Islands, tend to support the probability that *C. tortuosus* is also in reality a Southern-Indian form. Not a single *Cataulus* has hitherto been discovered in the Andaman Islands, in any of the countries to the east of the Bay of Bengal, or in the Malay Islands, so that the existence of the genus in the Nicobar Islands is extremely improbable.

29. REALIA (OMPHALOTROPIS) ANDERSONI, sp. nov., Plate II, Fig. 18.

Testa perforata, ovato-conica, tenuiuscula, rufescenti-fulva, lævigata, parum nitida, oblique striatula. Spira conica, lateribus subrectis, apice acuto, suturâ leviter impressâ. Anfr. 7, planiusculi; ultimus ad peripheriam capillaceo-carinatus, subtus convexus, lævigatus, radiatim striatulus, cariná circumumbilicari obtusâ, fere obsoletâ instructus. Apertura ovata, obliqua, fere diagonalis, spiram altitudine haud æquans. Peristoma obtusum, marginibus subconniventibus, callo tenui junctis, externo recto, basali expansiusculo, columellari subtus expanso, juxta perforationem emarginato, angulatim inciso. Operc.? Long. 7, diam. vix 5; ap. long. 3¼, lat. 2¾ mm.

HAB. In insulis Andamanicis (*J. Anderson*).

Shell perforate, ovately conical, thin, reddish brown in colour, smooth, not polished, obliquely striated. Spire conical, with sides nearly straight, apex acute, suture slightly impressed. Whorls 7, rather flat; the last with a hair-like keel at the periphery (the keel sometimes appearing on the upper whorls just above the suture), convex, smooth, and radiately striated below, and furnished with an obtuse, subobsolete keel around the umbilicus, the space inside the umbilical keel being smooth, not ribbed. Aperture ovate, oblique, nearly diagonal, a little shorter than the spire. Peristome obtuse, the margins approaching each other, and joined by a thin callus; outer edge straight, bâsal expanded, columellar expanded below, but emarginate and cut away into a re-entering angle near the perforation. Length 0·29, diameter 0·19; length of aperture 0·13, breadth 0·11 inch.

This species closely resembles *R.* (*O.*) *rubens* of Mauritius in form, but differs in sculpture, the shape of the whorls, &c. The umbilical keel is but faintly marked. Several specimens were procured about ten years ago by Dr. J. Anderson, Superintendent of the Indian Museum, to whom I am indebted for the types. They were obtained, I believe, at some distance from the coast.

30. REALIA PALLIDA, sp. nov., Plate II, Fig. 19.

Testa perforata, ovato-conica, tenuis, albido-cornea, lævigata, nitidula, vix verticaliter striatula. Spira conica, apice acuto, suturâ impressâ. Anfr. 6, *convexiusculi; ultimus ad peripheriam atque subtus rotundatus, circa perforationem radiatim striatus. Apertura fere verticalis, ovata, spiram altitudine haud æquans. Peristoma tenue, marginibus subconniventibus, callo tenui junctis, externo recto, columellari expansiusculo. Operc.? Long.* 4¼, *diam.* 3; *ap. long vix* 2, *lat.* 1½ *mm.*

HAB. In insulis Andamanicis cum præcedente (*J. Anderson*).

Shell perforate, ovately conical, thin, whitish horny, smooth, moderately polished, with faint subobsolete vertical striation. (There is also, beneath the lens, a faint indication of minute spiral striation, but I am not sure that this is not an individual peculiarity.) Spire conical, apex acute, suture impressed. Whorls 6, slightly convex, the last rounded at the periphery and below, radiately striated around the perforation. Aperture nearly vertical, ovate, shorter than spire. Peristome thin, margins approaching each other, joined by a thin callus; the outer lip simple, the columellar slightly expanded. Length 0·17, diameter 0·12, length of aperture 0·075, breadth 0·06 inch.

I have but a single specimen of this species, which wants both the keels of the last species, and differs besides in size, colour, and sculpture. The specimen is perhaps not quite adult, but there can, I think, be no question of its being a peculiar form.

Neither of the two species above described can be confounded with the globose *R.* (*O.*) *distermina* (Benson, Ann. & Mag. N. H. Dec. 1863; Pfeif., Mon. Pneum. Suppl. ii. p. 178) with its costulate striation near the suture and inside the umbilicus, its rounded whorls, and its aperture equal in length to the spire. A glance at the figure of this shell in the 'Conchologia Indica,' pl. clxv. fig. 10, will suffice to show how different it is from either *R. andersoni* or *R. pallida*. Even if, as is possible, Benson's type was a young shell, it was manifestly a very distinct species, and the adult would probably resemble *Realia* (*Omphalotropis*) *globosa* of Mauritius in shape.

31. Realia decussata, sp. nov.

Testa perforata, ovato-conica, tenuiuscula, striis obliquis incrementi, aliisque spiralibus, minutis, sublente subtilissime decussata, in anfractibus superioribus, nisi duobus supremis, undique, atque in inferioribus et supra et infra suturam costulato-striata, pallide rufescenti-fulva, anfractu ultimo cingulo pallido circumdato. Spira conica, apice acuto, sutura impressâ. Anfr. 6, convexi ; ultimus ad peripheriam rotundatus, subtus convexus, radiatim striatus, in umbilico costulato-striatus, lineâ impressâ basali in loco carinæ circum umbilicum instructus. Apertura obliqua, rotundato-ovata, $\frac{3}{7}$ longitudinis subæquans. Peristoma tenue, marginibus subconniventibus, callo tenui junctis, externo basalique rectis, columellari subtus expansiusculo, juxta perforationem retrosinuato. Operc. ? Long. 3¾, *diam.* 2¼ ; *ap. long.* 1¾, *lat.* 1½ *mm.*

Hab. Cum præcedentibus in insulis Andamanicis (*J. Anderson*).

Shell perforate, ovately conical, rather thin, finely marked with oblique striæ of growth and minute decussating spiral lines (only visible beneath the lens), costulately striated on the upper whorls (except the two uppermost) and close to the suture on the lower whorls, pale rufescent brown, with a pale band round the body whorl. Spire conical, apex sharp, suture impressed. Whorls 6, convex ; the last rounded at the periphery and below, radiately striated beneath, more strongly in the umbilicus, and having an impressed line at the base around the umbilicus in the place of a keel. Aperture oblique, oval, but little higher than broad, about $\frac{3}{7}$ of the length. Peristome thin, the margins approaching each other and united by a thin callus ; the outer and basal edges simple, columellar margin slightly expanded below, curved back into a shallow re-entering sinus close to the perforation. Length 0·15, diameter 0·11 ; length of aperture 0·07, breadth 0·06 inch.

This shell is distinguished by its fine decussated striation. I have but a single specimen, received from Dr. J. Anderson, with the others. Unfortunately no figure has been given, as I did not observe the distinction until after the accompanying plate had been drawn. Independently of sculpture, the species may be distinguished from *O. distermina* by its less globose form, and by the absence of the keel around the periphery ; from *R. andersoni* by its much smaller size, more rounded whorls, and by the absence of the keel ; and from *R. pallida* by rounder whorls, by colour, and by its rather more turreted form.

There is thus evidence of four different forms of *Realia* in the Andaman Islands. The genus is absolutely unknown in either India or Burma, the species of *Omphalotropis* (*O. aurantiaca*) once reported from

Pondicherry being really from the island of Mauritius ;[*] and it is uncertain that the forms reported from Cochin China, Siam, and Singapore are not *Assimineæ*. It is remarkable that the genus is almost entirely insular in its known distribution, and that it is especially common in the Mascarene Islands and in Polynesia.

32. PALUDOMUS TRAVANCORICA, *Beddome*, MS., Plate II, fig. 22.

Testa imperforata, ovato-conica, solidula, epidermide fuscâ induta, sub epidermide albida, fasciis fusco-purpureis flexuosis verticalibus ornata, costis spiralibus subconfertis circumdata, interspatiis glabris, striis incrementi inconspicuis. Spira conica, subturrita, apice eroso, suturâ impressâ. Anfr. superst. 3, *convexi, ultimus dimidium testæ superans. Apertura subverticalis, ovata, postice angulata, intus cærulescenti-albida, strigis flexuosis confertis conspicuis. Peristoma rectum, margine externo acuto, columellari basalique albis, intus incrassatis, dilatatis. Operc. normale. Diam maj.* 16, *min.* 13½, *alt.* 23 *mm.* (*apice non eroso ad* 25) *; apert.* 12 *mm. longa,* 9 *lata.*

HAB. In Travancore (*H. Beddome*).

Shell imperforate, ovately conical, rather thick, covered with a dark-brown epidermis ; beneath the epidermis white, with narrow vertical, very wavy dark purple stripes ; all the whorls spirally ribbed, the ribs rather close together, with the interspaces smooth, the striæ of growth being inconspicuous. Spire conical, apex eroded (doubtless acute when perfect), suture impressed. Whorls remaining 3 (probably in the perfect shell 5 or 6), convex, the last exceeding half the length of the shell. Aperture nearly vertical, ovate, angulate at the posterior extremity, bluish white, with conspicuous, close, vertical, wavy, deep purple bands within ; peristome in one plane, the external margin sharp, the columellar and basal margins white, thickened within, and dilated. Operculum normal. Major diameter 0·65 inch, minor 0·52, height (apex wanting) 0·9 (when perfect about an inch) ; aperture 0·5 high, 0·36 broad.

In a young specimen of *P. travancorica*, there appears to be a tendency to the development of minor parallel ribs between those forming the spiral sculpture, and the latter are rather closer together near the suture.

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[*] See Benson, A. M. N. H. Sept. 1851, Ser. II, Vol. 8. p. 194.—Nevill, Handlist Moll. I. M. pt. i, p. 320. Hanley, Conch. Ind. Systematic list of Species, p. xiii, note 1, whilst pointing out that the species is not Indian, states that it occurs in the Isle of Bourbon. As he does not give his authority, the name of the island may have been inserted by mistake for that of Mauritius, but it is possible that the form occurs, like *O. rubens* and two or three other species, in both islands.

This fine and well-marked from of *Paludomus* was procured by Colonel Beddome in streams traversing the plains between Trevandrum and the foot of the Aghastyamali hill.

So far as I am aware, none of the forms of true *Paludomus* hitherto described from Southern India and Ceylon have the marked spiral sulcation of the present species. There is, however, a remarkable resemblance to the Ceylonese *Philopotamis sulcata*, the shell of which is only distinguished by wanting the conspicuous coloured bands within the peristome, although the operculum is very different. Perhaps the nearest ally of *P. travancorica* is the Burmese *P. regulata*; but that is a less conical form, and differs both in sculpture and coloration, as may be seen by comparing the figure of the present species with that of *P. regulata* in the 'Conchologia Indica' (pl. cviii. fig. 5). In form, *P. travancorica* has some resemblance to the common *P. tanjorica** (*Helix tanshaurica*, Gmelin, Syst. Nat. p. 3655).

33. BYTHINIA EVEZARDI.

Testa anguste umbilicata, ovato-conica, solida, striis regularibus spiraliter circumdata, albido-cornea, epidermide crassâ olivaceâ obtecta. Spira conica, apice eroso, suturâ valde impressâ. Anfr. superst. 3 (*in testâ integrâ* 4-5), *convexi, ultimus dimidiam longitudinis subæquans, modice ventricosus, subtus circa umbilicum angulatim compressus, umbilico conico, intus lævigato. Apertura subverticalis ovata, antice atque postice subangulata; peristoma simplex, rectum, obtusum. Operculum normale. Long.* 3¾, *diam. maj.* 3¼, *min.* 2 *mm.; apert. intus fere* 2 *longa*, 1⅓ *lata.*

HAB. Ad Lanowlee (Lanaoli) juxta viam ferratum inter Bombay et Poona (*G. Evezard*).

Shell narrowly umbilicate, ovately conical, solid, surrounded by regular spiral impressed lines rather close together, whitish horny, covered with an olive epidermis. Spire conical, apex eroded, suture deeply impressed. Whorls remaining 3 (in a perfect shell about 4 to 5), rounded, the last about half the whole length, moderately ventricose, angulately compressed at the base around the umbilicus, which is conical and smooth inside. Aperture nearly vertical, oval, subangulate in front at the base and at the posterior extremity; peristome simple, straight, obtuse; operculum normal. Length 0·15, major diameter 0·13, minor 0·08 inch; aperture within 0·07 long, 0·05 broad.

This peculiar little species, distinguished by its distinct umbilicus from all other Indian forms, was obtained by Colonel G. Evezard at Lanaoli, a station on the railway from Bombay to Poona, situated a few miles east of Khandalla at the top of the Bor-ghat.

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* I think it is to be regretted that Gmelin's spelling should be adopted for this species, as the derivation of the name is thereby rendered obscure.

35. CREMNOCONCHUS FAIRBANKI.

"*Cremnoconchus fairbanki*, Blanford," Hanley, Conch. Ind. p. 58, pl. cxlvi, fig. 7.

I have described the species here attributed to me, and I greatly doubt my being responsible for the specific name, even in manuscript. I find amongst my collection a small box of *C. carinatus*, labelled *C. fairbanki*, but I cannot recollect whence the name was derived. The shell figured in the 'Conchologia Indica' resembles *C. carinatus* in form, but the angulation of the last whorl is not shewn, and the coloured bands represented are not, so far as I know, found in that species.

The shell figured in the same plate of the 'Conchologia Indica' (pl. cxlvi, fig. 10) as *C. carinatus*, is certainly not that species, but *C. conicus*, var. Some of the references in the letterpress, p. 58, to my descriptions and figures of *Cremnoconchus* (J. A. S. B. 1870, xxxix, pt. 2, pp. 10—12, pl. 3, figs. 3, 4, 5) are incorrect.

36. CORBICULA IRAVADICA.

"*Cor. iravadica*, Blanf. MSS." Hanley, Conch. Ind. p. 62, pl. clv, fig. 8.

Testa fere æquilateralis, rhomboideo-ovata, ventricosa, solidiuscula, concentrice striata atque costulis subremotis, interdum plus minusve obsoletis, ornata, epidermide olivaceâ induta, intus violacea : latere antico ante umbones prominentes subhorizontali, tunc fere regulariter convexo, postico declivi, oblique subtruncatulo, demum subangulato, margine ventrali modice arcuato ; ligamento postice subito contracto. Lat. 10½ *mm., long.* 9, *crass.* 7. *In alio exemplo long.* 11½, *lat.* 8½, *crass.* 7.

HAB. Ad Mandelay, urbem capitalem regni Avæ.

Shell nearly æquivalve, rhomboidally ovate, ventricose, thickish, concentrically striated and ornamented with ribs rather wide apart often more or less obsolete. The colour of the epidermis is olive, that of the shell inside violet. Anterior side nearly horizontal in front of the prominent umbones, then almost regularly convex, the posterior side slopes away gently at first, then sharply, almost as if truncated, and forms a rounded angle with the ventral margin, which is gently arcuate. The ligament behind is suddenly contracted and compressed, the hindermost portion, about a quarter of the length being very much smaller than the rest.

Dimensions of one specimen :—length 0·42 inch, breadth from umbones to ventral margin 0·36, thickness 0·28 ; of another much longer shell, the same measurements are 0·46, 0·34, and 0·28 inch.

It is very possible that this may not be separable from some of the numerous other forms of the genus, but I can find none precisely agreeing. The form is more ventricose and the umbones more prominent than in most

Indian *Corbiculæ.* The genus, like *Unio*, appears to have been designed by a beneficent Providence for the amusement of species-makers. Many of the described local races in all probability pass more or less into each other.

EXPLANATION OF THE PLATES.

Plate II.

Fig. 2. *Euplecta vidua*, var. *minor*, natural size.
„ 4. This shell has not been described, the type having been mislaid, and one figure, that shewing the shell from the mouth, omitted in the plate.
„ 5. *Euplecta vidua*, typical form, natural size.
„ 8. *Macrochlamys tenuicula*, two views, natural size. In the left hand figure one whorl too many is represented, and in the right hand figure the peristome is represented as thick instead of very thin.
„ 9. *Macrochlamys platychlamys*, two views, natutal size. In the right hand view the lip should have been represented as very thin.
„ 10. *Streptaxis personatus*, three views, enlarged two diameters, fair.
„ 11. *Streptaxis concinnus*, three views, enlarged two diameters, teeth rather indistinct, otherwise good.
„ 12. *Streptaxis pronus*, three views, enlarged two diameters, teeth not correctly represented; see description.
„ 13. *Streptaxis compressus*, three views, enlarged four diameters; the teeth are incorrect, especially in the middle figure, where three are represented on the basal margin of the aperture instead of one only.
„ 14. (Upper figure) *Ennea subcostulata*, enlarged four diameters. The columellar tooth should be lower down.
„ 14. (Lower figure) *Ennea exilis*, enlarged four diameters. All the teeth are wrongly represented; see description.
„ 15. *Ennea macrodon*, enlarged four diameters. The teeth in the peristome are not distinct in the figure, and the large tooth inside the base is omitted altogether.
„ 16. *Ennea stenostoma*, var., enlarged four diameters. Teeth not correct, they should be precisely the same as in fig. 17.
„ 17. *Ennea stenostoma*, typical form, enlarged four diameters. The mouth too broad, it should be of the same shape as in fig. 16. The teeth are correct.
„ 18. *Realia* (*Omphalotropis*) *andersoni*, enlarged two diameters: fair figure.
„ 19. *Realia pallida*, enlarged two diameters, not good, the penultimate whorl is by far too large, and the suture wrongly drawn.
„ 22. *Paludomus travancorica*, natural size, good figure.

N. B. As already noticed in the text, several of the figures in this plate are unsatisfactory. In especial, the teeth in the aperture of some forms of *Ennea* and *Streptaxis* are by no means accurately represented. The plate having been twice lithographed, it appears hopeless at present to try to obtain greater accuracy. The general form of the shells is as a rule correct. The imperfection of the plate is partly due to its having been lithographed during the absence of the author of the present paper.

Plate III.

Fig. 1. *Hemiplecta tinostoma.*
„ 2. *Hemiplecta enisa.*
„ 3. *Xestina albata.*
„ 4. *Ariophanta immerita.*
„ 5. *Macrochlamys wynnei.*
„ 6. *Spiraculum travancoricum.*
„ 7. *Cataulus costulatus.*

N. B. The figures on this plate are all fairly good; all are of the natural size except 7*b*.

XXI.—*List of Diurnal* Lepidoptera *from Port Blair, Andaman Islands, with Descriptions of some new or little-known Species and of a new Species of* Hestia *from Burmah.—By* J. Wood-Mason, *Deputy Superintendent, Indian Museum, and* L. de Nicéville.

(With Plate XIII.)

The first collection of Andamanese Lepidoptera of any importance was made by the native collector (Moti Ram) who accompanied Mr. Wood-Mason on his first visit to the Andaman Islands in the year 1872, and remained at Port Blair for some months after Mr. Wood-Mason's return to Calcutta, collecting insects in the immediate vicinity of the settlement. This collection was entrusted for determination and description in this Journal to the late Mr. W. S. Atkinson, who, however, only described in the 'Proceedings of the Zoological Society' two of the more obvious novelties, and eventually returned a few of the specimens to Mr. G. Nevill, who at that time had charge of the Museum collection of lepidopterous insects, and who placed them in the collection. These specimens are included in the present list.

Since 1872, numerous collections of Lepidoptera have been formed at Port Blair and at Kamorta in the Nicobars by the officers of the Port Blair establishment, and forwarded by them to England, where in 1877 Mr. F. Moore examined all the material that had been thus collected and drew up a complete list of "The Lepidopterous Fauna of the Andaman and Nicobar Islands," describing therein many new species and varieties both of butterflies and moths. In this list, 71 species of rhopalocerous Lepidoptera are recorded as inhabitants of the Andaman Islands. Since Mr. Moore's paper appeared, 4 new species and varieties of butterflies have been described by as many different authors, bringing up this number to 75. In the present list, 29 additional species, five of them described for the first time, are recorded, making a total of 104,—a number which might no doubt be largely increased by an experienced collector in a few weeks.

Several common species which occur everywhere in the neighbouring regions are not recorded, and these are all the more conspicuous by their absence from the circumstance that their supposed models are also absent; we allude to *Hypolimnas misippus*, *Elymnias undularis*, and the 2nd and 3rd forms of the female of *Papilio polytes*, which respectively mimick *Danais chrysippus*, *Danais plexippus*, *Papilio hector*, and *Papilio aristolochiae*. It is a curious fact that both in the Kulu valley and in the Simla district in the North-Western Himalayas, where *Papilio hector* and *P. aristolachiae* have never been found, the same forms of the female of *Papilio* *polytes* are also absent: whether they are really absent from the Andaman Islands and the other regions mentioned, and, if so, whether they ceased to be developed or rather were exterminated as soon as the species spread into regions wherein neither of the forms which its females mimick exist, are interesting subjects for future enquiry.

Tribe PAPILIONES.

Family NYMPHALIDÆ.

Subfamily DANAINÆ.

No representative of the genus *Hestia* has been received from Mr. de Roepstorff, but we are indebted to Capt. G. F. L. Marshall, R. E., for the gift of a specimen which that gentleman had received from Colonel Cadell, Chief Commissioner of the Andamans and Nicobars, but which does not agree with Felder's figure and description of *Hestia agamarschana*, the only species of the genus hitherto recorded from those islands, either in the extent and relations of the black markings or in the shape and proportions of the wings; the former being larger, more or less coalescent generally, and completely run together at the outer margin so as to form a distinct black border to each wing, and the posterior pair of the latter being broadly rounded off at the extremity and consequently not presenting the peculiar egg-shaped outline so characteristic of these organs in all the hitherto described Indian *Hestias, e. g., H. Lynceus, H. Jasonia*, etc., with the latter of which Felder compares his species; the specimen apparently also differs from *H. agamarschana* in having the white of all the wings everywhere more or less clouded with minute black scales. *H. agamarschana*, it is true, to judge from Felder's figure of it, has the posterior wings a little less pointed, the anterior discal spots on the anterior ones obviously more elongated, with more black in the cell and behind it, and the markings generally larger than in *H. Jasonia*, and it is, as might have been expected, more closely related to the specimen obtained by Col. Cadell than to any other species; but, large series of specimens having shown us how extremely constant the different species or local races of *Hestia* are, we cannot unite the two, and we think that the differences they present are in all probability due to a difference of station, and that Helfer may have obtained the specimen that served Felder for type on a different island; all the lepidopterous insects of late years received from the Andamans having been obtained in the immediate vicinity of the settlement at Port Blair, in an area therefore which is a very small fractional part indeed of the Andaman group of islands, which extends through nearly four degrees of latitude. We, therefore, propose to describe the specimen as a new species under the name of

1. Hestia Cadelli, n. sp., Pl. XIII, Fig. 1, ♂.

♂. Allied to *Hestia agamarschana*, Felder. Wings above pure subpellucid white clouded, especially on the outer halves, with minute black scales, and marked and veined with intense black; all the markings larger, more or less coalescent, and blurred or paler at the margins, the veins more broadly black-bordered, and the marginal spots completely run together so that the wings are all, especially the posterior ones, distinctly bordered externally with black.

Anterior wings relatively narrower and longer, being more than twice as long as broad, with the discoidal cell equal in length to the submedian vein, that is to say, to the inner margin, and all but as long as the outer margin measured in a straight line from the extremity of the submedian vein to that of the subcostal; with the anterior discal spots more elongated and more completely coalesced, the spot between the first and second median veinlets alone constantly free, and the large rounded one internal to it in the same cell coalescent with the enlarged extremity of the cellular mark (which fills the cell nearly to the level of the origin of the second median veinlet, and is divided at the base of the wing by three indistinct longitudinal clouded white streaks), and the large mark in front of the submedian vein larger, triangular, and united by a black streak to the discal black spot beyond it.

Posterior wings shorter and broader, with the outer margin more broadly rounded off, the cell and the interspaces beyond it broader, the spot in it larger, and all those around it free, though exhibiting a tendency to coalesce with the black margins of the veinlets.

Wings below dirty-white of a dull opalescent tinge, with fuscous-black markings and veins.

Length of fore-wing 2·45; extreme length of discoidal cell, 1·38; expanse 5 inches.

Hab. Port Blair, S. Andaman.

We have much pleasure in naming this species after Colonel Cadell, Chief Commissioner of the Andamans and Nicobars, who obtained it, and who has shown himself no less ready than his predecessors to help those who are engaged in working out the interesting fauna of the islands under his charge.

Obs. The specimens of *Hestia* which Hewitson, in his list of Butterflies from the Andamans (Ann. & Mag. Nat. Hist., ser. 4, vol. xiv, 1874, p. 356), considers to be specimens of *H. agamarschana* remarkable for their dark colour, doubtless belong here.

2. Danais melanoleuca.

Danais melanoleuca, Moore, Proc. Zool. Soc. Lond. 1877, p. 581, pl. lviii, fig. 3.

Numerous specimens of both sexes (*A. de Roepstorff* and *Moti Ram*).

3. EUPLŒA CORE.

Papilio core, Cramer, Pap. Exot. 1782, vol. iii, pl. 266, figs. E, F.
Euplœa core, Butler, Journ. Linn. Soc. Lond., Zoology, 1878, vol. xiv, p. 301.

One female (*Moti Ram*) agreeing with Bengal specimens.

4. EUPLŒA ANDAMANENSIS.

Euplœa andamanensis, Atkinson, Proc. Zool. Soc. Lond. 1873, p. 736, pl. lxiii, fig. 2, ♂. Butler, op. cit. p. 300.

Numerous males and females (*A. de R.* and *Moti Ram*).

This is one of the species described from the collection made by Moti Ram in 1872.

Subfamily SATYRINÆ.

5. LETHE EUROPA.

Pap. europa, Fabr. Syst. Entom. 1775, p. 500.

Males and females, all remarkably fine specimens.

6. MELANITIS LEDA.

Males and females (*A. de R.* and *Moti Ram*) and males of *M. ismene*, Cr.

7. MYCALESIS MINEUS, Linn.
„ DRUSIA, Cr.
„ BLASIUS, Fabr.

Males and females (*A. de R.* and *Moti Ram*).

8. MYCALESIS OTREA.

Pap. otrea, Cramer, Pap. Exot. 1782, vol. iv, pl. 314, figs. A, B.
—— *francisca*, Id., ibid., pl. 326, figs. E, F.

A female of one of the numerous varieties of this species.

8. MYCALESIS RADZA.

M. radza, Moore, Proc. Zool. Soc. Lond. 1877, p. 583, pl. lviii, fig. 2.

One male and two females.

9. ELYMNIAS COTTONIS.

M. cottonis, Hewitson, Ann. Mag. Nat. Hist. 1874, ser. 4, vol. xiv, p. 358, ♂ ♀.

Numerous males (*A. de R.* and *Moti Ram*); one female (*A. de R.*).

Subfamily MORPHINÆ.

10. DISCOPHORA CELINDE.

Pap. celinde, Stoll, Pap. Exot. Suppl. 1790, pl. 37, figs. 1, 1 A.

One female.

Subfamily NYMPHALINÆ.

11. CETHOSIA NICOBARICA.

Felder, Verhand. zool.-bot. Gesellsch. Wien, 1862, vol. xii, p. 484; Novara Reise, Lep. p. 384, pl. xlviii, figs. 7, 8, ♂.—Moore, Proc. Zool. Soc. Lond. 1877, p. 583, ♀.

Two pairs (*Moti Ram*) and one male (*A. de R.*) agreeing perfectly with specimens from the Nicobars.

12. ATELLA ALCIPPE.

Pap. alcippe, Cramer, Pap. Exot. 1782, vol. iv, pl. 389, figs. G, H.

Numerous specimens, male and female (*A. de R.* and *Moti Ram*).

13. CIRRHOCHROA ANJIRA.

C. anjira, Moore, Proc. Zool. Soc. Lond. 1877, p. 584, ♂ ♀.

Males and females.

14. CYNTHIA EROTA.

Pap. erota, Fabr., Entom. Syst. 1793, vol. iii, p. 76.

Numerous males and females.

15. MESSARAS ERYMANTHIS, VAR. NICOBARICA.

Felder, Verh. zool.-bot. Gesellsch. Wien, 1862, vol. xii, p. 486.

Males and a female.

16. JUNONIA ŒNONE.

Pap. œnone, Linn., Cramer, Pap. Exot. 1775, vol. i, pl. 35, figs. A, B, C.

Numerous males and females (*A. de R.* and *Moti Ram*).

17. JUNONIA ALMANA.

Pap. almana. Linn., Cramer, Pap. Exot. 1775, vol. i, pl. 58, figs. F, G.

One pair.

18. JUNONIA ASTERIE.

Pap. asterie, Linn., Cramer, Pap. Exot. 1775, vol. i, pl. 58, figs. D, E.

Three males and two females.

19. DOLESCHALLIA BISALTIDE.

Pap. bisaltide, Cramer, Pap. Exot. 1779, vol. ii, pl. 102, figs. C, D.

Numerous fine specimens of both sexes. Specimens were also obtained by Moti Ram in 1872.

20. KALLIMA ALBOFASCIATA.

K. albofasciata, Moore, Proc. Zool. Soc. Lond. 1877, p. 584.

Male and female.

21. EURYTELA HORSFIELDII.

Eurytela horsfieldii, Boisduval, Faun. Ent. Madag, 1833, p. 54, ♂.
——— *stephensii*, Id., ibid. p. 55, ♀.

A single male.

22. CYRESTIS COCLES.

Pap. cocles, Fabr., Moore, Proc. Zool Soc. London, 1878, p. 829.
? *Cyrestis formosa*, Felder, Reise Novara, Lep. p. 412, ♂.

A single male of this delicately tinted butterfly.

23. CYRESTIS THYODAMAS.

Cyr. thyodamas, Boisd. in Cuv. R. A. 1836, Ins., pl. 138, fig. 4. Doubld. Westw. and Hew. Gen. D. L., pl. 32, fig. 3.

Amathusia ganescha, Koll. in Hügel's Kaschmir, 1848, vol. iv, p. 430, pl. 7, figs. 3, 4.

One male.

24. HYPOLIMNAS BOLINA.

Pap. bolina, Linn., Clerk's Icones, pl. 21.—*Diadema bolina*, Wallace, Trans. Ent. Soc. Lond. 1869, p. 278.

Numerous male and females (*A. de R.* and *Moti Ram*).

25. HERONA MARATHUS, var. ANDAMANA.

Herona marathus, Westw. Doubl. and Hew. Gen. D. Lep. 1850, p. 293, pl. 41, fig. 3.
——— *andamana*, Moore, Proc. Zool. Soc. Lond. 1877, p. 585, ♂ ♀.

Two males and a female.

26. PARTHENOS GAMBRISIUS.

Pap. gambrisius, Fabr.

Numerous specimens of each sex (*A. de R.* and *Moti Ram*).

27. NEPTIS MANANDA.

N. mananda, Moore, Proc. Zool. Soc. Lond. 1877, p. 586, pl. lviii, fig. 4, ♀.

Two pairs (*A. de R.* and *Moti Ram*).

Seems very near to *N. khasiana*.

28. NEPTIS ANDAMANA.

N. andamana, Moore, Proc. Zool. Soc. Lond. 1877, p. 586, ♂ ♀.

Five males and a female (*A. de R.* and *Moti Ram*).

29. ATHYMA SELENOPHORA.

Limenitis selenophora, Koll. in Hügel's Kaschmir, 1848, vol. iv, p. 426, pl. vii, figs. 1, 2, ♂.

A female, the only one in the Museum, was obtained by Moti Ram in 1872.

30. SYMPHÆDRA TEUTA, var. TEUTOIDES.

S. teutoides, Moore, Proc. Zool. Soc. Lond. 1877, p. 586, ♂ ♀.

Males and females (*A. de R.* and *Moti Ram*).

31. TANAECIA CIBARITIS.

Adolias cibaritis, Hewitson, Ann. & Mag. Nat. Hist. 1874, ser. 4, vol. xiv, p. 358; Exot. Butt. vol. v, *Adolias*, pl. iv, figs. 12, 13, 15, ♂ ♀.

Tanaëcia cibaritis, Moore, Proc. Zool. Soc. Lond. 1877, p. 586.

Numerous males and females (*A. de R.* and *Moti Ram*).

32. TANAECIA ACONTIUS.

Adolias acontius, Hewitson, loc. cit. p. 357; Exot. Butt. vol. v, *Adolias*, pl. iv, fig. 11, ♀. *Tanaëcia acontius*, Moore, Proc. Zool. Soc. Lond. 1877, p. 586.

One female.

33. LIMENITIS PROCRIS, var. ANARTA.

L. anarta, Moore, Proc. Zool. Soc. Lond. 1877, p. 585.

One female.

34. NYMPHALIS ATHAMAS.

Pap. athamas, Drury, Ill. Exot. Entom. 1773, vol. i, pl. ii, fig. 4.

One female.

Family ERYCINIDÆ.

35. ABISARA BIFASCIATA.

A. bifasciata, Moore, Proc. Zool. Soc. Lond. 1877, p. 587, pl. lviii, fig. 1, ♀.

Three females.

Family LYCÆNIDÆ.

36. LAMPIDES ARDATES.

Lycaena ardates, Moore, Proc. Zool. Soc. Lond. 1874, p. 574, pl. lxvii, fig. 1, ♂.

One female.

37. LAMPIDES ÆLIANUS.

Hesp. aelianus, Fabr., *Lycaena aelianus*, Horsfield, Cat. Lep. E. I. Co., 1829, p. 73.

One male.

38. LAMPIDES ELPIS.

Polyomm. elpis, Godt., Encyclo. Méth. Ins. vol. ix, p. 654.—*Lycaena elpis*, Horsfield, opcit. p. 76, pl. 1, fig. 4, ♀ ♂.

One female and one male (*A. de R.* and *Moti Ram*).

39. LAMPIDES PANDAVA.

Lycaena pandava, Horsfield, op. cit. p. 84, ♀.

One female.

40. LAMPIDES conf. PACTOLUS.

♀. Wings above much as in *L. pactolus*, differing in having the dark fuscous outer border of the anterior wing spotless and that of the posterior wing very much less distinctly marked in the same manner, no discocellular mark in either wing, and the whole upperside apparently more clouded with smoky fuscous scales.

Wings beneath very pale fuscous, with a submarginal fascia composed of rhomboid spots and a marginal one of narrow oval spots fuscous of a rather darker shade than the ground, both margined and connected together by whitish, the latter of them developed, in the interval between the first and second median branches, into a conspicuous jet-black circular spot divided externally by a semicircle of pale blue metallic scales and encircled internally by luteous white, and into two minute ones, one on each side of the submedian vein, internally covered with blue scales.

Anterior wings with two small subcostal spots, a short discocellular fasciole, and a discal fascia strongly faulted at the second median veinlet so that the outer white margin of its posterior portion is in line with that of its anterior portion, and the inner white margin of its posterior portion in line with the discocellular veinlet.

Posterior wings with a similar discocellular fasciole, and complexly faulted and contorted discal and basal fasciæ; all the fasciæ in all the wings margined on both sides with fuscous of a very slightly deeper tint than the ground and with whitish.

Since the above description was written, we have discovered that five unnamed insects in the Museum from Cherrapunji in the Khasi Hills, the Sikkim Hills, and Sibsagar *(S. E. Peal)* in upper Assam are males of this species, and the following is a brief description of one of them:—

♂. Wings above semitranslucent palish fuscous with a light and tolerably brilliant amethystine lustre, edged with a darker anteciliary line.

Wings below much as in the female, with the macular submarginal fuscous fascia of all the wings broader, and the anal and subanal black spots rather larger and conspicuously encircled with fulvous internally.

Length of anterior wing ♀ ·72, ♂ ·58—·68; whence expanse = ♀ 1·5, ♂ 1·2—1·4 inches.

41. LAMPIDES PLUMBEOMICANS, n. sp.

Closely allied to the preceding, but much smaller; with three instead of two fasciæ on the underside of the anterior wings, with all the fasciæ relatively broader, and with those of the posterior wings much less complexly faulted and contorted.

♂. Wings above dark amethyst-purple with a dull greyish leaden metallic lustre, with a deep black anteciliary line and fuscous fringe.

Wings beneath pale fuscous of a purplish tinge, with a marginal and a submarginal fascia composed of suboval spots of a darker shade than the ground, both margined and connected by whitish, the latter of them bearing in the posterior wings subanal and anal black spots in every respect as in the preceding except that the luteous inner line is rather more distinct.

Anterior wings with a basal fascia, a discocellular fasciole, and a discal fascia faulted as in the preceding at the second median veinlet; with the fasciæ as also the fasciole commencing at the costal vein where they are all broken.

Posterior wings with corresponding fasciole and fasciæ, which latter are more or less faulted at every vein though much less contorted and consequently more easily traced than in the preceding; fasciæ and fascioles of both wings margined on both sides with fuscous of a rather deeper shade than the ground and with whitish.

♀. Wings above dull smoky.

Anterior wings with a pale discal patch which has a brilliant metallic pale bluish lustre in certain lights.

Posterior wings with a thin interrupted white line before the dark anteciliary one and a submarginal row of dark spots before it, spots and line increasing in size, breadth, and distinctness from the apical angle to the subanal region, the former obscurely encircled internally with smoky whitish.

Wings beneath lighter, with all the markings more pronounced, being margined with fuscous much darker than the ground and with pure white, and the marginal and submarginal macular fasciæ, especially conspicuous and coarse.

Length of anterior wing ♂ ·56, ♀ ·58, whence expanse = ♂ 1·12, ♀ 1·16 inches.

Two males and a female.

42. POLYOMMATUS SANGRA.

P. sangra, Moore, Proc. Zool. Soc. Lond. 1865, p. 772, pl. 41, fig. 8, ♂.

Innumerable males and females. The commonest 'blue' in Calcutta, being obtainable in any number wherever there is a patch of grass.

43. APHNÆUS LOHITA, var. ZOILUS.

A. zoilus, Moore, Proc. Zool. Soc. Lond. 1877, p. 588, ♂.

♀. Larger than the male. UPPERSIDE smoky brown, marked obscurely with darker bands corresponding to those of the underside. UNDERSIDE with the intervals between the bands wider owing to the greater breadth of the wings. In all other respects as in the male.

Length of fore-wing ·7 ; whence expanse = 1·46 inches.

Males and one female.

44. HYPOLYCÆNA ERYLUS.

H. erylus (Godart), Hewitson, Ill. D. Lep. Lyc. p. 49, pl. xxi, fig. 1 ♂, 2, 4 ♀.

H. andamana, Moore, Proc. Zool. Soc. Lond. 1877, p. 589, ♂ ♀.

Three males and a female. Absolutely indistinguishable from fresh Sikkim specimens.

45. SITHON SUGRIVA, var. ARECA.

Amblypodia sugriva, Horsfield, Cat. Lep. E. I. Co. 1829, p. 105, pl. i, figs. 10, 10*a*, ♂.

Myrina sugriva, Horsfield and Moore, Cat. Lep. E. I. Co. p. 51, pl. 1*a*, fig. 12, ♂.

Myrina areca, Felder, Verhand. zool.-bot. Gesellsch. Wien, 1862, vol. xii, p. 481, ♂.

♀. Smaller than the male. UPPERSIDE sepia-brown with a bronzy gloss, the spots and fasciæ of the underside scarcely showing through. *Hindwing* with a pure white patch divided by the brown veins, margined externally by a fine and sharp dark brown or black anteciliary line, and marked by a large circular black spot at the base of the tail on the anterior side and by another smaller lighter and less distinct one on the posterior side; with the caudal lobe blackish, and the tails black with pure white cilia. UNDERSIDE pure white marked as in the male with dark sepia-brown fasciæ and spots, but with the black caudal spots larger and the cilia of the posterior part of the hind-wing pure white like those of the tails.

Length of fore-wing ·66 ; whence expanse = 1·38 inches.

It differs from *S. phocides* ♀ (= *S. jolcus* (Felder), Hew., Ill. D. Lep. Lyc. pl. xiii, figs. 16, 17) in the far less extent of the white patch on the upperside of the hind-wing, and in the larger size and darker colour of the spots and fasciæ, as well as in the greater pureness of the white, of the underside generally.

One male and one female, the former differing from a specimen from the Indian continent (Sylhet) only in its rather darker and more distinctly marked underside. The lighter apical portion of the fore-wing in the male has a beautiful bronzy gloss changing to dark purple according to the incidence of the light. Both the insular and continental specimen, but especially the former, present slight traces of the blue marginal band so conspicuous in the hind-wings of Javan and Ceylonese examples, in the shape of a small patch of metallic green scales on the anterior caudal lobe.

The male of this species, with its velvety black upperside, rich dark brown underside, and elongated hind-wings produced into long robust buff tails, presents a strong contrast to the dull-coloured female with her pure dazzling white underside conspicuously spotted and banded with dark brown, broader wings, and comparatively short and feeble white and black tails.

Sithon kamorta is not the female of *S. sugriva*, var. *areca*, as Felder has suggested, but that of a distinct though closely-allied species peculiar to the Nicobars, whence the Museum has recently received a specimen of the true male differing from *S. kamorta* just in the same way as *S. sugriva* ♂ does from its female, which appears not to have been previously described.

46. SITHON WESTERMANNII, var.

Dipsas westermannii, Felder, Reise Novara, Lep. p. 241, pl. xxx, figs. 21, 22, ♀, from Luzon.

A male and a female, the latter differing from the former in having the upperside smoke-brown instead of purplish fuscous, no discal pale patch in the fore-wing, the hind-wing devoid of blue, and the underside ochraceous-brown instead of dark fawn-colour with a vinous tinge. The male differs from the same sex of *S. westermannii*, in having less blue on the upper surface, and the anal spot completely encircled with grey scales.

A comparison of Andamanese with Philippine specimens would, we have no doubt, show that the former is just as much entitled to a name of its own as the latter. Both are merely insular races of the Indian continental *S. jangala*.

47. SITHON TARPINA.

Myrina tarpina, Hewitson, Ill. D. Lep. Lyc. Suppl. 1877, p. 23, pl. (Suppl.) iii *a*, figs. 93, 94, ♀.

♂. UPPERSIDE rich deep metallic violet-blue, with the anterior margin of the fore-wing narrowly, and the external margin of both wings more broadly and decreasingly bordered with black. UNDERSIDE with about the basal two-thirds of both wings cœrulescent or virescent opaque dead white, the rich red-brown of the outer margins darker but similarly banded and marked with white, and the orange spots smaller with a diffused patch of greyish white scales between them and two or three in front of them all somewhat confounded with the white marginal line.

Three specimens.

Length of forewing ·84; whence expanse = 1·78 inches.

48. DEUDORIX EPIJARBAS.

Dipsas epijarbas, Moore, Cat. Lep. E. I. Co. 1857, vol. i, p. 32, ♂ ♀.
Deudorix epijarbas, Hew., Ill. D. Lep. Lyc. pl. vii, figs. 16, 18, ♂, 17, ♀.

Very numerous specimens of both sexes.

49. DEUDORIX DIENECES.

D. dieneces, Hewitson, Ill. D. Lep. Lyc. Suppl. 1878, p. 31, pl. v *a*, figs. 65, 67 ♂, 66 ♀.

Males and females.

The Museum possesses males from Silhet and Calcutta also.

50. DEUDORIX ORSEIS.

D. orseis, Hewitson, Ill. D. Lep. Lyc. 1863, p. 23, ♂.

♀. UPPERSIDE lighter, with a distinct purple gloss which has a light steel-bluish tint at the base of all the wings. UNDERSIDE lighter, with all the markings more distinct.

Length of fore-wing ·68; whence expanse = 1·42 inches.

Two males and two females.

51. DEUDORIX VARUNA.

Thecla varuna, Horsfield, Cat. Lep. E. I. Co. 1829, p. 91, ♂ ♀.

A single male.

52. MYRINA ATYMNUS, var. PRABHA.

Myrina prabha, Moore, Proc. Zool. Soc. Lond. 1877, p. 589, pl. lviii, fig. 5, ♀.

Males and female.

53. AMBLYPODIA NARADA, var. ERICHSONII.

Amblypodia narada, Horsfield, Cat. Lep. E. I. Co. 1829, p. 98, pl. 1, fig. 8, ♂ ♀.
——— *erichsonii*, Felder, Reise Novara, Lep. p. 218, ♀, from Luzon.

Two females.

54. ARHOPALA CENTAURUS, var. CORUSCANS.

Pap. centaurus, Fabr. *Ambly. centaurus*, Horsf., Cat. Lep. E. I. Co. 1829, p. 102. Hewitson, Cat. Lyc. Brit. Mus. pl. ii, figs. 10—13, ♂ ♀.

Male and female; the latter much smaller than the former. The bases of both wings in both sexes, but especially in the female, lighter, with a greenish tinge, so that the whole central portion of the insects appears brilliantly illuminated by a pale greenish blue reflection in most lights.

55. Surendra quercetorum, var. latimargo.

S. latimargo, Moore, Proc. Zool. Soc. Lond. 1879, p. 142, ♂ ♀.

A male and two females.

Is *A. quercetorum* itself more than a local race or variety of *A. vivarna*, Horsfield, Cat. Lep. E. I. Co. 1829, p. 99, from Java?

Family PAPILIONIDÆ.

Subfamily Pierinæ.

56. Terias hecabe.

Pap. hecabe, Linn.

Males and a female.

57. Terias harina.

T. harina, Horsfield, Cat. Lep. E. I. Co. 1829, p. 137.

Males and females.

58. Hebomoia roepstorffii.

H. Roepstorffii, Wood-Mason, antea, p. 134 ♂, et p. 150, ♀.

"♂. Differs from *H. glaucippe*, the only species of the genus with which I have been able to compare it, on the UPPERSIDE, in having the apical orange patch of the fore-wing larger, extended into the cell, and less broadly bordered with fuscous, both internally and externally; the submarginal fuscous spots smaller and completely isolated from the fuscous of the outer margin; the fore-wing at the posterior angle tinged, and the hind-wing externally broadly bordered, with bright sulphur-yellow, which colour is shaded off into the cream-colour of the rest of both wings; and the outer margin of the hind-wing narrowly edged with fuscous, which gradually broadens from the anal to the anterior angle and extends inwards in points at the veins:—and, on the UNDERSIDE, in having the brown mottling of the fore-wing arranged in the form of a tolerably conspicuous band coincident with the macular band of the upperside; and the ground-colour of the hind-wing, as also that of the mottled portion of the fore-wing, of a rich golden-luteous colour.

Length of fore-wing 1·76; whence expanse = 3 62 inches.

♀. UPPERSIDE. *Fore-wing* with the orange patch devoid of amethystine gloss, externally more broadly bordered with fuscous (which at each veinlet gives off inwards an angular process the extremity of which is continued on as a very narrow edging to each side of the veinlet), but internally much less distinctly so than in the male; with the cell more clouded with dark scales; and with the sulphur-colour at the inner angle more diffused. *Hind-wing* with a marginal row of large subtriangular fuscous spots placed upon the veinlets from the first subcostal to the first median (the two last obsolete), decreasing from the second in the direction of the anal angle, and connected together at the extreme margin of the wing by a narrow edging of the same colour, which extends to the anal angle; with a submarginal series of six roundish spots, similarly decreasing from the first, and alternating with those of the marginal series, each being placed upon a fold, the first and largest on the fold between the costa and the first branch of the subcostal, and the last on that between the first and second median veinlets; and with the sulphur-colour around the four intermediate submarginal spots stained with orange. UNDERSIDE of *both wings* paler.

Length of fore-wing 1·7; whence expanse = 3·5 inches.

HAB. South Andaman.

In a specimen of the male from the collection of Captain G. F. L. Marshall, the submarginal fuscous spots of the fore-wing are obsolete.

The place of this species would seem to be between *H. vossii* (Maitland) and *H. sulphurea*, Wallace."

59. IXIAS ANDAMANA.

I. andamana, Moore, Proc. Zool. Soc. Lond. 1877, p. 590, ♂ ♀.

Numerous males and females (*A. de R.* and *Moti Ram*).

60. CATOPSILIA CROCALE.

Pap. crocale, Cramer, Pap. Exot. 1779, vol. i, pl. lv, figs. C, D, ♀.
Callidryas crocale, Butler. Lep. Exot. 1869-74, p. 22, pl. ix, figs. 1, 2, 3, 6, ♂ ♀.

Two males.

61. PIERIS NADINA, var. NAMA.

Pieris nadina, Lucas, in Guérin's Rev. et Mag. Zool. 1852, ser. 2, vol. iv, p. 333, ♂.
P. nama, Moore, Proc. Zool. Soc. Lond. 1857, p. 102, pl. 44, figs. 1, 2, ♂ ♀.
——— Hewitson, Ex. Butt. *Pieridae*, pl. 6, fig. 37.

Males and females.

62. PIERIS CORONIS, var. LICHENOSA.

Pap. coronis, Cramer, Pap. Exot. vol. i, 1776, pl. 44, figs. B, C.
Pier. lichenosa, Moore, Proc. Zool. Soc. Lond. 1877, p. 591.

Two pairs.

63. ERONIA VALERIA, var. NARAKA.

Pap. valeria, Cramer, Pap. Exot. 1779, vol. i, pl. 85, fig. A, ♂.
Eronia naraka, Moore, Proc. Zool. Soc. Lond. 1877, p. 591, ♂ ♀.

Males and a female.

The Javan specimens of the male described by Horsfield and figured by Cramer both have the black outer border of the anterior as well as the posterior wings immaculate, and thus agree more closely with the S. Indian (var. *pingasa*), Ceylonese (var. *ceylonica*), and Andamanese (var. *naraka*) varieties. As might have been expected from its more northern station, the Andamanese more nearly approaches the north Indian form (var. *gaea*).

64. TACHYRIS PAULINA.

Pap. paulina, Cramer, Pap. Exot. vol. ii, pl. 110, figs. E, F, ♀.
Pieris albina, Boisd., Sp. Gén. Lep. p. 480, ♂.
Tachyris paulina, Wallace, Trans. Ent. Soc. Lond. 1867, ser. 3, vol. iv, p. 369.

Two males and two (white) females differing in no respect from those of continental India (Naga Hills, Cachar, Bhutan, and Madras).

Tachyris galathea, Felder, is a perfectly distinct race peculiar to the Nicobars, whence we have specimens.

Subfamily PAPILIONINÆ.

65. ORNITHOPTERA HELIACONOIDES.

Ornith. heliconoides, Moore, Proc. Zool. Soc. Lond. 1877, p. 592, ♂ ♀.

A male and a female.

66. PAPILIO CHARICLES.

P. charicles, Hewitson, Ann. & Mag. Nat. Hist. 1874, ser. 4, vol. xiv, p. 356; Exot. Butt. vol. v, *Pap.* pl. xiv, fig. 45, ♀.

One female of the 3rd form (*Moti Ram*).

This is the Andaman representative of the continental *P. androgeus*; it is interesting to find that it has acquired the red tails of its model, *P. rhodifer*, the slight Andamanese modification of the continental *P. doubledayi*.

67. PAPILIO MAYO.

P. mayo, Atkinson, Proc. Zool. Soc. Lond. 1873, p. 736, pl. lxiii, fig. 1, ♂.

Two males (*A. de R.* and *Moti Ram*). The species was described by Atkinson without acknowledgment from the specimens obtained by Moti Ram.

The Andamanese representative of the continental *P. polymnestor*.

68. PAPILIO POLYTES, var. NIKOBARUS.

Felder, Verh. zool.-bot. Gesellsch. Wien, 1862, vol. xii, p. 483.

Males and females of the first form only (*A. de R.* and *Moti Ram*).

69. PAPILIO AGAMEMNON.

Males and females (*A. de R.* and *Moti Ram*).

70. PAPILIO EURYPYLUS.

One pair.

71. PAPILIO CLYTIA, var. FLAVOLIMBATUS.

P. dissimilis, var. *flavolimbatus*, Oberthür, Etudes d'Entom. 4 me livr. p. 101, ♀.

This variety agrees in the size and distinctness of the cretaceous white markings of the upperside best with specimens from Silhet, Sibsagar, and Burmah on the Indian mainland, but differs from them, as indeed it does from all specimens in the Museum, in the large amount of rich golden yellow at the outer margin on both sides of the posterior wings: the marginal and submarginal flavous spots seen at the anal angle of the wing in most continental specimens are in this case so completely run together on both sides as to have left only a small central spot of the black ground-colour that separates them from one another in continental specimens; they are succeeded by a series of six (incisural) marginal spots of the same colour; the submarginal lunules are much larger and more spear-shaped and, moreover, sullied with yellow, especially the one near the anal blotch: on the *underside*, the marginal golden yellow spots are larger and tend to coalesce with the hastate submarginal markings, which consequently are more suffused with yellow than they are on the upperside.

A single male.

72. PAPILIO LÆSTRYGONUM.

P. laestrygonum, Wood-Mason, Proc. Asiat. Soc. Bengal, June, 1880, p. 102, et antea, p. 178, pl. vi, fig. 1, 1*a*, ♂.

P. epaminondas, Oberthür, Etudes d'Entom. 4 me livr. p. 62, pl. iv, fig. 1, ♂.

"♂. Wings above cretaceous-white, the anterior ones black at the insertion, scarcely tinged with greenish at the base, with five black bands commencing at the anterior margin and cutting the cell, the first basal, extending to the inner margin, the second rather broader, also extending to the inner margin, and emitting a short conical process at the origin of the first median veinlet, the third scarcely broader, extending to the median vein, the fourth narrower, triangular, reaching or all but reaching the median vein, the fifth much the broadest of all, triangular, divided anteriorly into two forks by a curved narrow decreasing and interrupted band of the ground-colour running from the costal vein to the third median veinlet, extending to the inner margin, separated from the black outer marginal band by a band of the ground-colour divided by the black veins and very slightly if at all narrowing from the anterior margin up to the second median veinlet, whence it gradually decreases in width and distinctness to the inner angle; all these black bands connected at the anterior margin, and the first, second, and fifth of them at the inner margin also, by a very narrow edging of black.

Posterior wings with two black bands commencing and connected at the anterior margin and coinciding with bands of the underside, one basal, extending to the end of the first half of the first median veinlet, and the other discal, extending a short distance into the space between the 2nd and 3rd median veinlets; with a small black spot near the end of the cell scarcely distinct from the discal band; with four discal spots immediately beyond the cell running nearly parallel with the band, the first and largest transversly elongated and coinciding with a spot on the underside, the rest smaller than the corresponding ones on the underside, which latter are consequently seen through the wing-membrane beyond the margins of the former; with a black spot succeeded by one of luteous at the anal angle; with a marginal and submarginal series of black lunules coalescent in the anterior third but more distinct in the posterior two-thirds of the wing, where the two series are more or less separated from one another by ashy-grey scales continuous with the ashy patch occupying the outer third of the wing and extending also along so as to obscure the ultra-cellular part of the basal black band; with the discal band and spots more or less irrorated and obscured with ashy-grey scales so that the disk of the wing appears mottled with black and grey; and with the black tails, as also the incisures, margined with cretaceous-white.

Wings below pure white, anterior ones marked as above, with the ground-colour at the base and between the black bands as far as the median vein and its second branch yellowish; with the band of ground-colour separating the fifth black band from the black outer border distinct, and not decreasing but on the contrary rather increasing in breadth, to the inner angle; and with the curved line dividing the fifth black band into two forks more distinct and less discontinuous.

Posterior wings, from the base up to the median vein and the discal black band, yellowish, with three black bands, one narrow running from the insertion along the inner margin close to the abdominal fold, and two broader commencing and connected at the anterior margin and cutting the cell, one of these latter basal, extending nearly to the end of the basal half of the first median veinlet, and the other discal, some distance into the space between the 2nd and 3rd median veinlets, the two first of the three bands connected together at their outer extremities and with two largish coalescent black spots in the anal region; with a small black spot near the extremity of the cell, and six of the same colour immediately beyond it disposed in a line which runs straight from the costal vein as far as the cell, but then curves abruptly inwards, the first of these spots transversely elongated, extending from vein to vein, and connected with the second, which is roundish and itself connected with the discal band, the third oval, about one-third the size of the second, and touching the discocellular veinlet, the fourth twice the size of the third, in contact with the median vein and its two last branches, the fifth rather smaller than the third, the sixth crescentic and connected with the two above-mentioned large spots in the anal region; with six large diffused luteous blotches externally margined with black, and increasing in size and depth of colour from the anterior to the inner margin; with the ground-colour between these blotches and the discal black spots pure white; with an increasing series of six marginal lunules, between which and the wavy black margins of the luteous blotches the ground-colour is white in the anterior and grey or greyish-white in the posterior portion of the wings; and with the incisures and the tails margined with lutescent.

Head black with two white frontal bands; pronotum with a luteous spot on each side; thorax above jet-black ornamented at the sides with long grey setæ, below cretaceous-white; abdomen cretaceous-white with a tapering dorsal black band and two lateral fuscous ones.

Length of anterior wing 1·7; whence expanse = 3·5 inches.

Hab. South Andaman. Two males.

To mark its close relationship to *A. antiphates*, I have called the species *P. laestrygonum* after the mythical people over whom Antiphates is supposed to have reigned. It differs from its nearest ally in having the upperside much blacker (the bands of the forewing being broader; the first, second, and fifth of them together with the marginal one extending to the inner margin, where they are all connected together by a very narrow black edging; and the disk of the hindwing mottled as it were by black and grey), a much greater extent of grey, and more highly developed marginal and submarginal lunules on the hindwing; in the abdomen being dorsally banded with black and the thorax ornamented with grey setæ, &c."

73. Papilio rhodifer.

P. rhodifer, Butler, Ent. Month. Mag., vol. xiii, 1876, p. 57.

Five males.

Fam. HESPERIDÆ.

74. Ismene chromus.

Numerous examples (*A. de R.* and *Moti Ram*).

75. ISMENE ARIA.

Ismene aria, Moore, Proc. Zool. Soc. Lond., 1865, p. 784, ♂ ♀.—Hewitson, Exot. Butt., vol. iv, *Hesp.*, pl. iii, figs. 24, 25, ♀.

Male and female.

76. ISMENE LEBADEA.

Hesperia lebadea, Hewitson, Exot. Butt., 1868, vol. iv, *Hesp.* pl. iii, figs. 22, 23, ♂.

One male.

77. ISMENE DRUNA.

I. druna, Moore, Proc. Zool. Soc. Lond. 1865, p. 784, ♂.—Hewitson, Exot. Butt. vol. iv, 1868, *Hesp.* pl. iii, fig. 26, ♂.

Two males.

78. TAGIADES RAVI.

Pterygospidea ravi, Moore, Proc. Zool. Soc. Lond. 1865, p. 779, ♂ ♀.

One male and two females.

79. TAGIADES ALICA.

T. alica, Moore, Proc. Zool. Soc. Lond. 1877, p. 593, pl. lviii, fig. 11, ♂.

♀. Above lighter, the dark markings consequently appearing more prominent.

The anterior wing has a minute transparent speck behind the three subapical ones, a very indistinct and small double whitish spot near the end of the cell on the upperside, and two discal whitish spots on the underside, the anterior one of which only is partially transparent and visible on the upperside.

The posterior wing is less white above and has the anal angle rounded as in *T. obscurus.*

Male and female.

80. PLESIONEURA ALYSOS.

P. alysos, Moore, Proc. Zool. Soc. Lond. 1865, p. 789.

Many specimens.

81. HESPERIA OCEIA.

H. oceia, Hewitson, Desc. Hesp. 1868, p. 31.

Males.

82. HESPERIA COLACA.

H. colaca, Moore, Proc. Zool. Soc. Lond. 1877, p. 594, pl. lviii, fig. 7, ♂ ♀.

Two specimens.

83. HESPERIA CAHIRA.

H. cahira, Moore, Proc. Zool. Soc. Lond. 1877, p. 593, pl. lviii, fig. 8, ♂ ♀.

Males and females.

84. HALPE BETURIA.

Hesperia beturia, Hewitson, Desc. Hesp. 1868, p. 36.

Halpe beturia, Moore, Proc. Zool. Soc. Lond. 1878, p. 690.

Males and one female. A pair from Calcutta in the Museum. The number of spots in the forewing varies from 6 to 8.

85. HESPERIA CHAYA.

H. chaya, Moore, Proc. Zool. Soc. Lond. 1865, p. 791.

Male.

86. TELEGONUS THYRSIS.

Telegonus thyrsis (Fabr.), Butler, Fabr. Lep. p. 262.

Hesperia pandia, Moore, Proc. Zool. Soc. Lond. 1865, p. 790.

Three males.

87. PAMPHILA MÆSOIDES.

P. maesoides, Butler, Trans. Linn. Soc. Lond., ser. 2, Zoology, vol. i, p. 554.

Many specimens.

88. PAMPHILA GOLA.

P. gola, Moore, Proc. Zool. Soc. Lond. 1877, p. 594, pl. lviii, fig. 9, ♂.

Numerous specimens (*A. de. R.* and *Moti Ram*).

During the preparation of the foregoing list, we received from Bassein, on the mainland, two females of a species of *Hestia* of the same type as *H. cadelli*, in which the modifications of form and markings begun in *H. agamarschana* and continued in *H. cadelli* are carried to an extreme. These insects were obtained by Mr. Algernon Haden, who has generously presented one of them to the Museum, and after whom we have, consequently, all the more pleasure in naming the species

HESTIA HADENI, n. sp., Pl. XIII, Fig. 2, ♀.

♀. Closely allied to *H. cadelli*. Wings above pure fleckless white marked and veined with black of a fuscous tint; with the marginal, submarginal, and all but the two posterior (which are subcoalescent with the marginal band) of the discal series of spots in the anterior wings, but with the marginal and submarginal series only in the posterior wings, completely run together so that only the inner portions of the outlines of the innermost series of the coalesced spots are in either case still discernible, and so as to form a very broad outer border of black to each of the wings.

Anterior wings broader and shorter, being less than twice as long as broad, the extreme length of the cell bearing the same relation to the submedian vein and to the less deeply emarginate outer margin; with the spot at the base of the second cell smaller and free of the veins, as also is the discoidal cellular spot at its posterior extremity; the curved club-shaped mark in the 3rd inner marginal cell much as in *H. agamarschana*, but not connected by a black streak with the subcoalescent marginal spot beyond it; the outer black border with a clouded white spot in the second cell more or less distinctly separating the second discal black spot off from the band; and the black second inner marginal, or sutural, cell longitudinally streaked with clouded white.

Posterior wings broader, with their undulated outer margin still more broadly rounded; the spot in the discoidal cell smaller and the spots around it also rather smaller and free of the black outer border though exhibiting a tendency to coalesce with it in front of the second median veinlet.

Wings below of a less pure white than above, marked and veined with fuscous.

Thorax more conspicuously marked with greyish-white than in *H. cadelli*, in which these marks are almost effaced, but this character, as also the difference in the proportions, and the less obvious emargination of the outer margin, of the wings, may be sexual.

Length of anterior wing 2·54; extreme length of its discoidal cell 1·35; expanse 5·18 inches.

HAB. Bassein, Burmah. Two specimens agreeing in every respect with one another.

EXPLANATION OF PLATE XIII.

Fig. 1. *Hestia cadelli*, W.-M. & de N., ♂.
Fig. 2. *Hestia hadeni*, W.-M. & de N., ♀.

XXII.—*Description of an* Arvicola *from the Punjab Himalayas.*

By W. T. BLANFORD, F. R. S.

ARVICOLA WYNNEI, sp. nov.

A. *superne rufescenti-fuscus, aliquando griseo-lavatus, subtus pallidior, caudâ pedibusque cum dorso concoloribus, caudâ fere $\frac{2}{7}$ corporis cum capite æquante; auriculis brevibus, vellere contectis, pilis longiusculis extus munitis; unguibus longis, albidis compressis, pilis haud obtectis; pollice brevi, unguifero; dente molario inferiore antico angulis* 4 *externis,* 5 *internis, spatiis in coronâ* 7 *munito, secondo tertioque singulis angulis utrinque tribus, totidem spatiis; dente superiore primo spatiis* 5, *angulis utrinque tribus, secundo spatiis* 4, *angulis tribus externis, duobus internis, tertio denique angulis tribus, quorum ultimus rotundatus, externis, duobus internis, in lobum elongato-ovatum postice productum desinente notando. Long. corporis cum capite* 0·12 *met., caudæ* 0·032, *auris* 0·07, *pedis posterioris a calcaneo* 0·18, *cranii* 0·028.

HAB. Ad Mari (Murree) in montibus Himalayanis occidentalibus, ad latus occidentale fluminis Jhelum.

General colour above dark rich brown with a slight greyish tint, head rufescent, lower parts pale brown, tail the same colour as the back, feet covered with brown hair above, soles pale. Fur very soft, dark leaden grey at the base and for about $\frac{3}{4}$ the length, tips dark rufous brown on the back, dirty white below. Ears short and rounded, concealed beneath the fur, thinly clad with long hair outside and with short brown hair inside near the border; a tuft of long hair on the anterior edge of the inner surface. Tail between $\frac{1}{3}$ and $\frac{1}{4}$ the length of the head and body, cylindrical, clothed with long hair at the base and with short brown hairs throughout the terminal three quarters of it length. Claws long, compressed, white, not concealed by long hairs, thumb small with a short compressed claw. The under side of the tarsus is hairy.

The following are the dimensions, in inches, of two specimens, both adult males, in spirit:—

	1	2
Length of head and body from nose to anus,................	4·75	3·5
Ditto tail from anus (hairs at end not included), ...	1·35	1·2
Height of ear from orifice, ...	0·25	0·26
Breadth of ditto, ...	0·25	0·26
Length of fore-foot without claws,............................	0·4	0·4
Ditto of hind-foot and tarsus without claws,............	0·7	0·7
Ditto of claw of middle toe,......................................	0·11	0·13

The incisors are deep orange. The following are the characters of the molars:—

Upper molar I;	5	spaces or prisms	3	external and	3	internal angles
„ „ II	4	„	3	„	2	„
„ „ III	4	„	3	„	2	„
Lower molar I	7	„	4	„	5	„
„ „ II	3	„	3	„	3	„
„ „ III	3	„	3	„	3	„

Described from two specimens in spirit and two skins sent by Mr. A. B. Wynne, of the Geological Survey. I have called the species after the discoverer, by whom I am informed that the native name is '*Kanis.*'

I hope to give a fuller description of this and the other Himalayan forms shortly.

XXIII.—*Some new Species of Rhopalocerous* Lepidoptera *from the Indian Region*—*By* CAPTAIN G. F. L. MARSHALL, R. E., *and* LIONEL DE NICE'VILLE.

(Received December 27th, 1880.)

1. EUPLŒA (SALPINX) ADAMSONI, Marshall.

♂. Allied to *E. superba*, Herbst, but differing on the UPPERSIDE of the *forewing* in that the brilliant blue gloss is confined to the basal two-thirds not reaching to the costa or the inner margin, and that the spots are reduced to four in number all very small, one subcostal above the end of the cell, and one in the cell at the end both lilac, and two near anal angle, one marginal and the other submarginal, white. *Hindwing* as in *E. superba*.

HAB. Moulmein; taken in the autumn by Captain C. H. E. Adamson.

2. ZOPHOESSA JALAURIDA, de N.

♂. Nearest to *Z. atkinsonia*, Hewitson; from which it differs on the UPPERSIDE in being deep brown instead of tawny and in having the macular bands and bar in the cell of the *forewing* ochreous. On the UNDERSIDE the ground colour is also deep brown, and the *hindwing* is crossed by several silvery white streaks on the basal half.

HAB. Jalauri pass, N. W. Himalayas.

3. LETHE MAITRYA, de N.

♂. Allied to *Lethe sidonis*, Hewitson, from which it differs on the UPPERSIDE in having an obscure ochreous band across the *forewing* beyond the cell, and on the UNDERSIDE in the band in the cell, as also the band beyond the cell, of the *forewing* being very prominent, both of which bands are ochreous instead of silvery white.

HAB. Jalauri pass, N. W. Himalayas.

4. LETHE SIDEREA, Marshall.

♂. Allied to *L. sidonis*, but differs in being smaller, in the uniform spotless upper surface, and the uniform paler brown ground-colour of the underside. *Forewing* entirely wanting the discal bands and the whitish spots on the costal margin; the only markings being three minute submarginal white spots beyond the cell (the middle one faintly circled with black), a single yellowish marginal line edged on both sides with dark brown, and within this a distinct silvery lilac submarginal line extending from the apex to the second median nervule. *Hindwing* with all the silvery streaks brighter and more distinctly lilac; the ocelli all blacker and less prominently pupilled with white; the second and third ocelli from the apex out of line, much nearer the margin, the silvery band within following this curve and deeply sinuated beyond the cell.

HAB. Sikkim.

5. LETHE SATYAVATI, de N.

♀. Similar in outline to *L. latiaris* ♀ and differing from it on the UPPERSIDE only in the absence of the transverse oblique ochreous line and the subcostal spot near apex of forewing. UNDERSIDE pale brown with no ochreous tint, and washed with lilac, especially on the outer half: both wings crossed by a prominent brown nearly straight subbasal line outwardly margined with lilac. *Forewing* with an irregular discal transverse brown line; a bar in the cell within the subbasal line; five indistinct submarginal ocelli circled with lilac and brown on a lilac ground; and a yellowish marginal line edged on both sides with dusky, within which a a brown band on the lilac ground between the ocelli and the margin. *Hindwing* with a discal very much angled dark brown line, within which is a very distinct lilac litura above the third median nervule; the submarginal ocelli large, the upper one distinctly pupilled with white and all of them profusely speckled with white; the usual marginal markings.

HAB. Sibsagar, Assam (*S. E. Peal*).

6. NEOPE BHIMA, Marshall.

♂. Allied to *N. moorei*, Butler. UPPERSIDE: *hindwing* with only six oval black submarginal spots circled with yellow, the first minute, the rest large, prominent; two swarthy submarginal lines and the margin itself swarthy. UNDERSIDE: the basal area of both wings pale olivaceous brown, irrorated and irregularly streaked and spotted with dark brown, with a few ochreous spots and streaks. A nearly straight band of pale ochreous across both wings beyond the middle bordered interiorly with dark brown most broadly on the forewing. *Forewing* with a row of five oval black spots pupilled with white and banded with yellow, the third and fourth much larger, placed on a broad discal brown band; a pale ochreous submarginal band beyond uniting at the anal angle with the pale ochreous median band, the margin and two submarginal lines swarthy on a yellow-brown ground. *Hindwing* with a sinuous band of eight perfect ocelli, the seventh and eighth with yellow irides coalescing.

HAB. Burmah; taken in April in the upper Thoungyeen forests, Tenasserim, by Captain C. T. Bingham.

7. EREBIA SHALLADA, Lang.

♂. ♀. Allied to *E. kalinda* but rather larger, and the male broader-winged than in the species mentioned; darker and less brightly coloured. UPPERSIDE with a small, diffused, dark ferruginous patch within the middle of exterior margin on *both wings*, smaller than in *E. kalinda* on the forewing, and larger on the hindwing.

HAB. Kunawar. This species was discriminated by Col. A. M. Lang, R. E., some years ago, but no description has hitherto been published.

8. EREBIA MANI, de N.

♂. ♀. Allied to *E. kalinda*, Moore, from Kulu specimens of which species it differs on the UPPERSIDE in the larger extent and lighter and yellower colour of the patch on the *forewing;* and in the entire absence of the ferruginous patch on the *hindwing:* and on the UNDERSIDE by having the yellowish patch on the *forewing* as on the upperside and abruptly defined.

HAB. Chung pass and Lingti, Ladak.

9. MYCALESIS OCULUS, Marshall.

♂. ♀. Allied to *M. onatus*, Hewitson. UPPERSIDE: *forewing* with the lower ocellus considerably larger, and broadly surrounded with ferruginous yellow; the yellow almost reaching the inner margin and connected by a band of the same colour with the costa: *hindwing* with four increasing black ocelli white-pupilled and with yellow rings, the yellow rings coalescing. UNDERSIDE with a yellow discal band crossing both wings, prominent in the female, obsolete except near the costa in the male.

HAB. Travancore; taken in May in the Ashamboo hills by Mr. Harold S. Fergusson.

10. Libythea rohini, Marshall.

♀. **Upperside** brown with pure white markings. *Forewing* with an oval spot filling the end of the cell, a large quadrate spot on the disc between the first and second median nervules, two spots coalescing one on each side of the upper discoidal nervule, and a spot near the costa divided into three by the subcostal nervules. *Hindwing* with a large square spot on the costa, a straight median band across the wing below the cell not reaching the inner or outer margins and cut by the discoidal and three median nervules, and a small spot above between the subcostal nervules. All the spots and bands pure white.

Hab. Khasi hills; taken near Shillong in May by Mr. J. P. Cock.

With the exception of *Euplœa adamsoni*, *Lethe siderea*, and *L. satyavati*, all the species above characterised will be figured in the descriptive hand-book of the butterflies of the Indian region which we shall shortly publish under the title of 'The Butterflies of India, Burmah, and Ceylon'; and in which fuller detailed descriptions of all will be found.

* * *

XXIV.—*Description of* Parantirrhoea Marshalli, *the Type of a new Genus and Species of Rhopalocerous Lepidoptera from South India.*—*By* J. Wood-Mason, *Deputy Superintendent, Indian Museum, Calcutta.*

Family NYMPHALIDÆ.

Subfamily Satyrinæ.

Parantirrhoea,* n. gen.

♂. Anterior wings triangular; anterior margin moderately and regularly arched; apical angle acute; outer margin almost straight, being only just perceptibly convex; inner angle rounded; inner margin sinuous, being lobed at the base much as in the males of *Clerome* and *Æmona*, genera of Morphinæ; subcostal vein 4-branched, the first branch given off before, and the second beyond, the end of the discoidal cell, the first, second, and third coalescing successively and respectively with the costal vein, the first, and the second, and all three in turn becoming free and running off at a tangent, like the costal vein, to the anterior margin, the fourth being perfectly free from its origin and running to the apical angle; posterior discocellular veinlet long, very slightly concave outwards, almost straight, intermediate one not quite half the length of the posterior, ante-

* From *παρά*, by the side of, and *Antirrhoea*, generic name.

rior one rudimentary; submedian vein sinuous, short, terminating in the wing membrane near the inner margin at about the level of the junction of the basal and second fourth of the length of that margin, being, in fact, hardly more developed than is the internal vein of the PAPILIONINÆ as compared with that of many Heterocerous Lepidoptera; the first median veinlet directed straight outwards and backwards, out of its normal course, to the inner angle and supplying the place of the rudimentary submedian; on turning to the underside, it is seen that a narrow rounded lobe of the functional sutural area about six times as long as it is broad is folded back upon the under surface, to which it is firmly adherent; this lobe occupies the middle two-fourths of the length of the inner margin, and is thickly clothed on its surface and fringed at its free edge with firmly attached, long, and somewhat raised modified scales rendered conspicuous by their rich dark brown colour and satiny lustre; the outline of this turned up lobe is marked out on the upperside by a curvilinear groove.

Posterior wings tailed, subquadrate, with four distinct margins, *viz.*, a strongly and irregularly arched anterior margin, nearly straight external and posterior margins, and an inner or abdominal margin, marked out by the obtuse-angled apex, the tail, and the well-rounded anal angle; with a black oval sexual mark, divided by the submedian vein, near the anal angle; costal vein short and straight, terminating before, and the first branch of the subcostal which originates close to the base of its vein ending beyond, the middle of the length of the anterior margin, the second branch being given off before the middle of the discoidal cell and extending into the apical angle; 'discoidal' vein in the same straight or slightly curved line with the subcostal; discocellalar veinlet sinuous; the third median veinlet produced to a conspicuous tail.

Antennæ fine and distinctly clubbed.

Female unknown.

No Asiatic genus of SATYRINÆ presents us with any approach to the remarkable arrangement of the two hindermost veins of the anterior wings described above; but, in the South American genus *Antirrhoea*, we meet with identically the same arrangement, the first median veinlet in *A. archaea* and its congeners running back to the inner angle and the submedian vein ending a considerable distance short of that angle, though not nearly so far short of it as in the Indian form, for which I propose the above name in allusion to these remarkable points of resemblance, reserving all further comparisons and comment until I shall be in possession of specimens of the South American forms.

P. marshalli, n. sp.

♂. Wings above dark fuscous suffused with rich deep violet.

Anterior wings with an outwardly and forwardly arched subcrescentic pale violet or mauve band commencing beyond the middle of the wings at the costal vein, terminating at the inner angle, and crossed obliquely by a series of three small white spots disposed in a straight line parallel to the outer margin and placed upon folds of as many consecutive cells, the last being between the two anterior median veinlets.

Posterior wings relatively longer-tailed than in *Melanitis ismene* (Cramer) with the membranous parts of the divergent tails almost wholly formed by the produced wing-membrane of the interspace between the second and third median veinlets, a very narrow anterior membranous edging only being contributed by the interspace next in front; and with rather more than the basal two-thirds of their length in front of the discoidal and subcostal veins ochreous.

Wings below ochreous obscurely striated with a deeper shade of the same colour, and marked with a submarginal series of inconspicuous brown specks, the probable rudiments of ocelli.

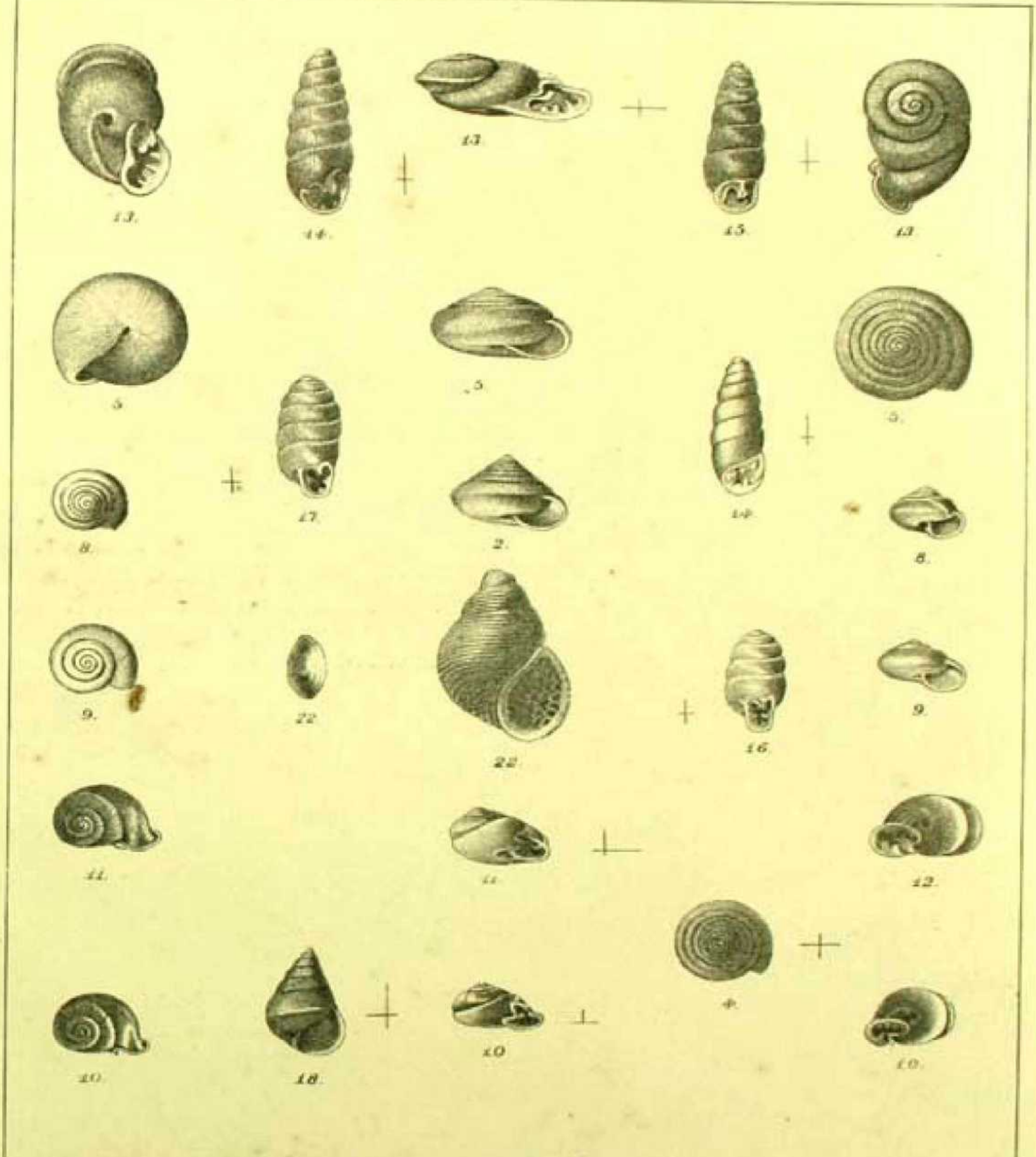
Length of anterior wing 1·16; whence expanse = 2·4 inches.

The female will, in all probability, prove to differ from the male not only in the absence of the sexual spot in the posterior wings, but also in having the inner margin of the anterior wings straight and neither lobed at the base nor turned up in the middle, and the first median veinlet and the submedian vein of the same wings normally arranged and developed and directed respectively to the outer margin and to the inner angle after the manner usual amongst butterflies.

HAB. Trevandrum, Travancore, South India. Described from four specimens of the male, one, the type, recently purchased by the Indian Museum, and three belonging to Captain G. F. L. Marshall, R. E., to whom I am indebted not only for the opportunity of describing this interesting insect, but also for permission to dissect one of the specimens in his collection.

P. S.—The species of the genus *Elymnias* alone present the same disposition of the three anterior veins of the posterior wings.

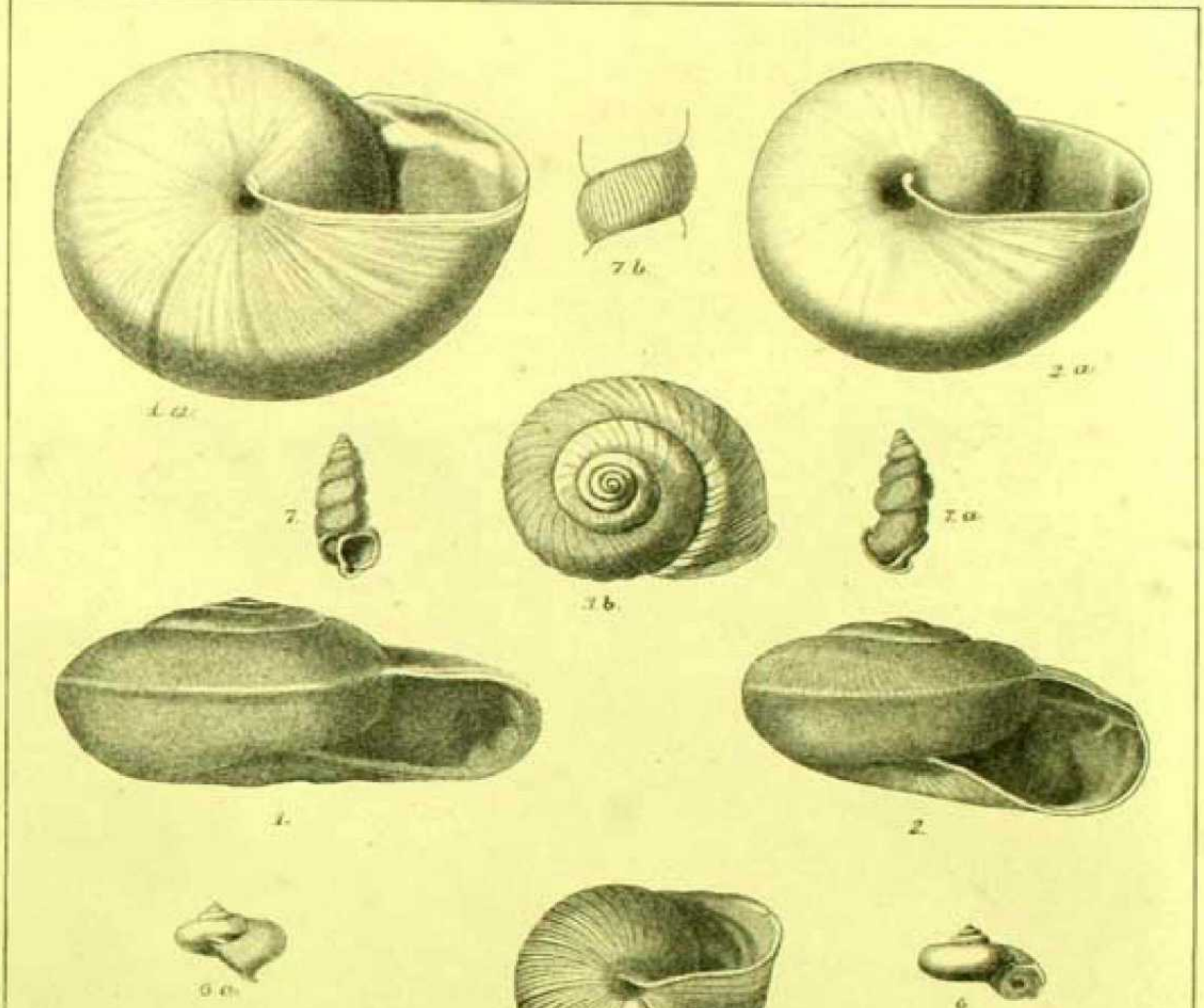
W. T. BLANFORD, Journ. As. Soc. Bengal, Vol XLIX Pt. II. 1880. Pl. II.



J. Schaumburg Lith.

Printed by W. Newman & Co. Calcutta.

W. T. BLANFORD, Journ. As. Soc. Bengal, Vol. XLIX Pt. II 1880. Pl. III.



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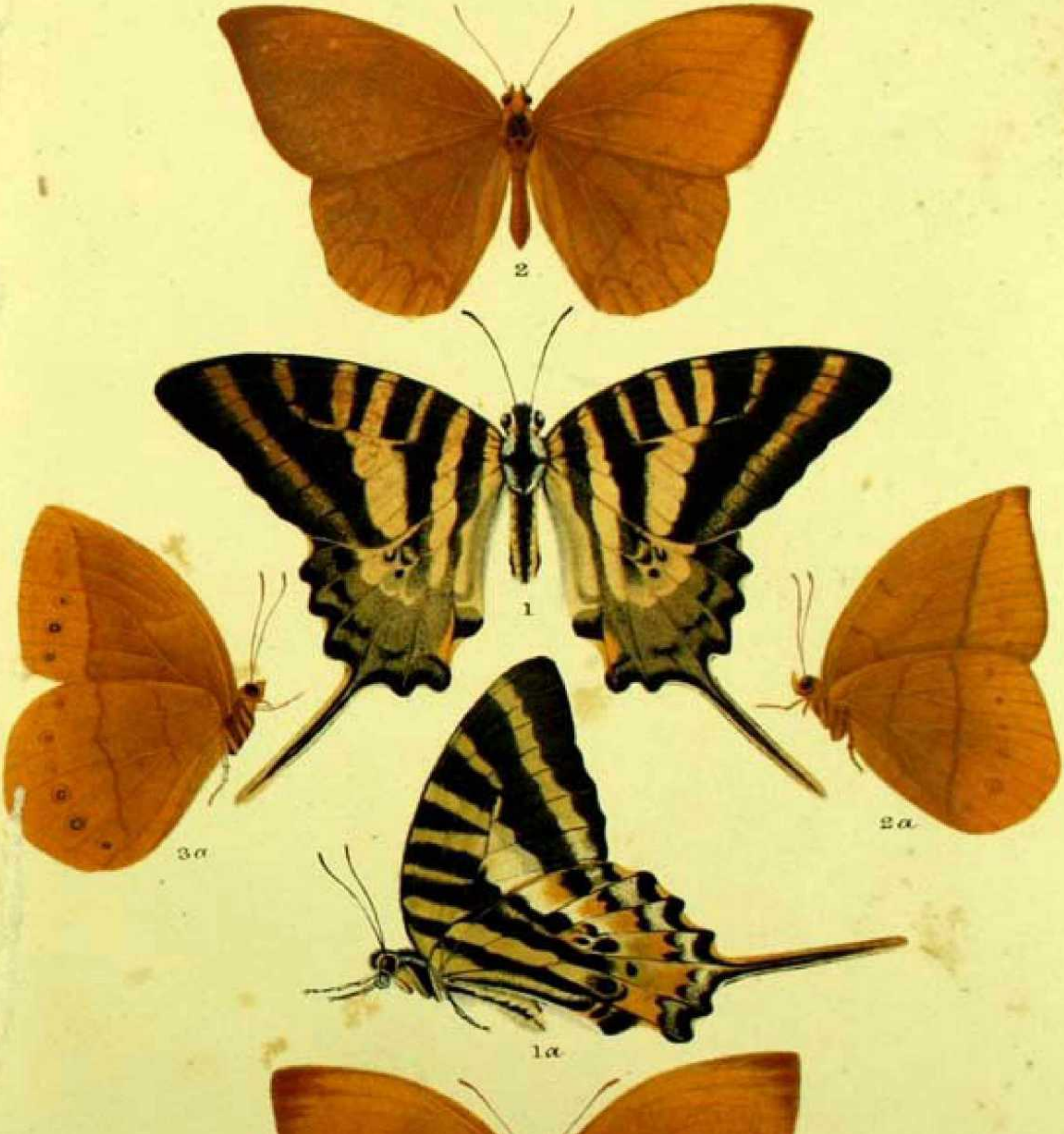
J. WOOD-MASON. Journ. As. Soc. Bengal. Vol. XLIX. Pt. II. 1880. Pl. VI.



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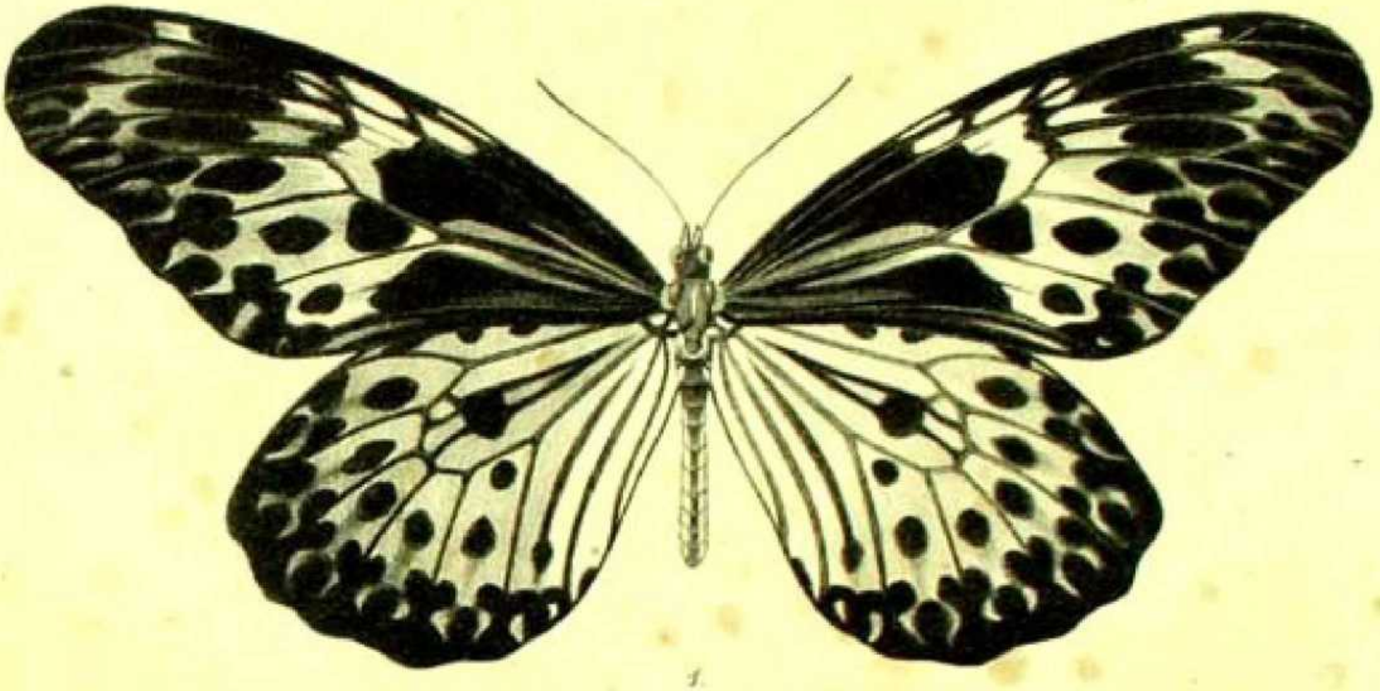
WOOD-MASON & DE NICEVILLE Journ As Soc Bengal Vol XLIX, Pt II, 1880. Pl. XIII



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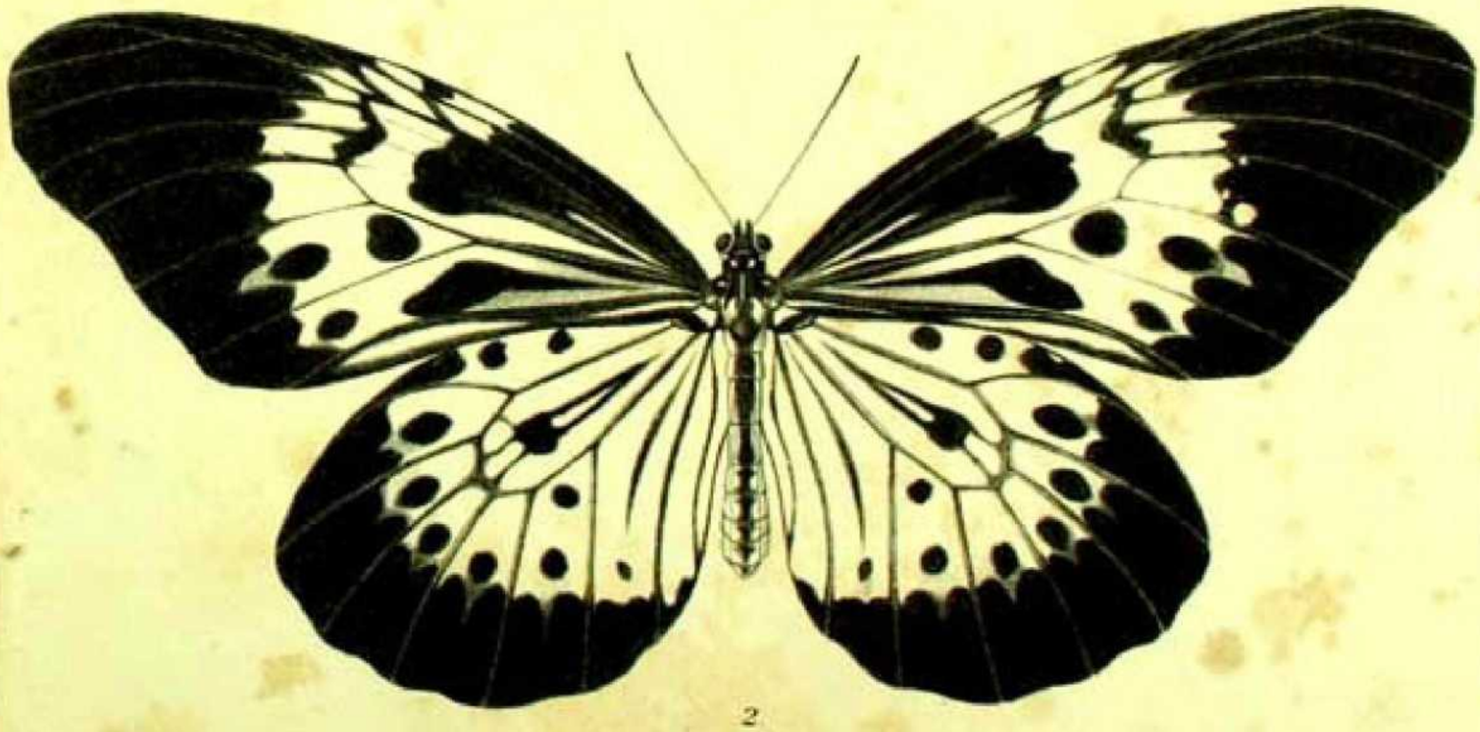

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B. L. Das del. J. Schaumburg pict. del. et Lith

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Fig 1 HESTIA CADELLI, ♂
Fig 2 HESTIA HADENI. ♀